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STATE OF NORTH CAROLINA )  
 ) ss.  
COUNTY OF DURHAM )

T.R.A. DOCKET ROOM

BEFORE ME, the undersigned authority, duly commissioned and qualified in and for the State and County aforesaid, personally came and appeared James H. Vander Weide, being by me first duly sworn, deposed and said that:

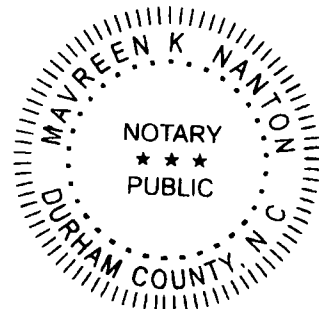
He is appearing as a witness on behalf of Tennessee-American Water Company before the Tennessee Regulatory Authority, and if present before the Authority and duly sworn, his testimony would be set forth in the annexed transcript.

James H. Vander Weide  
James H. Vander Weide

Sworn to and subscribed before me  
this 7<sup>th</sup> day of ~~2004~~ September, 2004

Maryann K. Nanton  
Notary Public

My Commission Expires April 18, 2009



**STATE OF TENNESSEE  
BEFORE THE TENNESSEE REGULATORY AUTHORITY**

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**IN THE MATTER OF:**

**ADJUSTMENT OF THE RATES OF  
TENNESSEE-AMERICAN WATER COMPANY**

**CASE NO. 2004-**

**DIRECT TESTIMONY  
OF**

**DR. JAMES H. VANDER WEIDE  
ON BEHALF OF**

**TENNESSEE-AMERICAN WATER COMPANY**

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1    **I.        WITNESS IDENTIFICATION**

2    **Q 1     What is your name and business address?**

3    A 1     My name is James H. Vander Weide. I am Research Professor of  
4           Finance and Economics at the Fuqua School of Business of Duke  
5           University. I am also President of Financial Strategy Associates, a firm  
6           that provides strategic and financial consulting services to business  
7           clients. My business address is 3606 Stoneybrook Drive, Durham, North  
8           Carolina.

9    **Q. 2    Would you please describe your educational background and prior**  
10           **academic experience?**

11   A 2     I graduated from Cornell University in 1966 with a Bachelor's Degree in  
12           Economics. I then attended Northwestern University where I earned a  
13           Ph.D. in Finance. In January 1972, I joined the faculty of the School of  
14           Business at Duke University and was named Assistant Professor,  
15           Associate Professor, and then Professor.

16                Since joining the faculty I have taught courses in corporate  
17           finance, investment management, and management of financial  
18           institutions. I have taught a graduate seminar on the theory of public  
19           utility pricing and lectured in executive development seminars on the  
20           cost of capital, financial analysis, capital budgeting, mergers and  
21           acquisitions, real options, cash management, short-run financial  
22           planning, and competitive strategy. I have also served as Program  
23           Director of several executive education programs at the Fuqua School of

1 Business, including the Duke Advanced Management Program, the  
2 Duke Executive Program in Telecommunications, the Duke Competitive  
3 Strategies in Telecommunications Program, and the Duke Program for  
4 Manager Development for managers from the former Soviet Union.

5 I have conducted seminars and training sessions on financial  
6 analysis, financial strategy, cost of capital, real options analysis, cash  
7 management, depreciation policies, and short-run financial planning for  
8 a wide variety of U.S. and international companies, including ABB,  
9 Accenture, Allstate, Ameritech, AT&T, Bell Atlantic, BellSouth, Carolina  
10 Power & Light, Contel, Fisons, Glaxo Wellcome, GTE, Lafarge,  
11 MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific  
12 Bell Telephone, Progress Energy, Inc, The Rank Group, Siemens,  
13 Southern New England Telephone, TRW, and Wolseley Plc.

14 In addition to my teaching and executive education activities, I  
15 have written research papers on such topics as portfolio management,  
16 the cost of capital, capital budgeting, the effect of regulation on the  
17 performance of public utilities, the economics of universal service  
18 requirements, and cash management. My articles have been published  
19 in American Economic Review, Financial Management, International  
20 Journal of Industrial Organization, Journal of Finance, Journal of  
21 Financial and Quantitative Analysis, Journal of Bank Research, Journal  
22 of Accounting Research, Journal of Cash Management, Management  
23 Science, The Journal of Portfolio Management, Atlantic Economic

1 Journal, Journal of Economics and Business, and Computers and  
2 Operations Research. I have written a book titled Managing Corporate  
3 Liquidity an Introduction to Working Capital Management, and a  
4 chapter for The Handbook of Modern Finance, "Financial Management  
5 in the Short Run."

6 **Q 3 Have you previously testified on financial or economic issues?**

7 A 3 Yes. As an expert on financial and economic theory, I have testified on  
8 the cost of capital, competition, risk, incentive regulation, forward-looking  
9 economic cost, economic pricing guidelines, depreciation, accounting,  
10 valuation, and other financial and economic issues in some 350 cases  
11 before the U.S. Congress, the Canadian Radio-Television and  
12 Telecommunications Commission, the Federal Communications  
13 Commission, the National Telecommunications and Information  
14 Administration, the Federal Energy Regulatory Commission, the public  
15 service commissions of 40 states, the insurance commissions of five  
16 states, the Iowa State Board of Tax Review, and the National Association  
17 of Securities Dealers. In addition, I have testified as an expert witness in  
18 proceedings before the U.S. District Court, District of Nebraska; U.S.  
19 District Court, Eastern District of North Carolina; Superior Court, North  
20 Carolina; the U.S. Bankruptcy Court, Southern District of West Virginia,  
21 and the United States District Court for the Eastern District of Michigan

22 **II. PURPOSE OF TESTIMONY**

23 **Q 4 What is the purpose of your testimony?**

1    A 4    I have been asked by Tennessee-American Water Company (TAWC or  
2            the Company) to prepare an independent appraisal of its cost of equity  
3            capital and to recommend a rate of return on equity that is fair, that  
4            allows TAWC to attract capital on reasonable terms, and that allows  
5            TAWC to maintain its financial integrity.

6    **Q 5    Did you estimate TAWC's cost of equity directly from its stock  
7            price?**

8    A 5    No. Since TAWC's stock is not publicly traded, I could not estimate  
9            TAWC's cost of equity directly from its stock price. Instead, I estimated  
10          TAWC's cost of equity from stock market data for two groups of proxy  
11          companies.

12   **Q 6    What average cost of equity do you find for your proxy companies?**

13   A 6    On the basis of my studies, I find that the average cost of equity for my  
14          proxy companies is in the range 10.4 percent to 11.5 percent. This  
15          conclusion is based on my application of three standard cost of equity  
16          estimation techniques: (1) the discounted cash flow (DCF) model,  
17          (2) the ex ante risk premium method; and (3) the ex post risk premium  
18          method.

19   **Q 7    What is your recommendation regarding TAWC's cost of equity?**

20   A 7    I recommend that TAWC be allowed a rate of return on equity in the  
21          range 10.4 percent to 11.5 percent. My recommended cost of equity  
22          range is conservative because TAWC has significantly higher financial  
23          leverage, and, hence, greater financial risk, than my proxy companies.

1    **Q 8    Do you have schedules accompanying your testimony?**

2    A 8    Yes. Six schedules and three appendices which were prepared by me or  
3            under my direction and supervision accompany my testimony.

4    **III.    ECONOMIC AND LEGAL PRINCIPLES**

5    **Q 9    How do economists define the required rate of return, or cost of**  
6            **capital, associated with particular investment decisions such as the**  
7            **decision to invest in water treatment, storage, and distribution**  
8            **facilities?**

9    A 9    Economists define the cost of capital as the return investors expect to  
10          receive on alternative investments of comparable risk.

11   **Q 10   How does the cost of capital affect a firm's investment decisions?**

12   A 10   The goal of a firm is to maximize the value of the firm. This goal can be  
13          accomplished by accepting all investments in plant and equipment with  
14          an expected rate of return greater than or equal to the cost of capital.  
15          Thus, a firm should continue to invest in plant and equipment only so  
16          long as the return on its investment is greater than or equal to its cost of  
17          capital.

18   **Q 11   How does the cost of capital affect investors' willingness to invest**  
19          **in a company?**

20   A 11   The cost of capital measures the return investors can expect on  
21          investments of comparable risk. The cost of capital also measures the  
22          investor's required rate of return on investment because rational  
23          investors will not invest in a particular investment opportunity if the



1 expected return on that opportunity is less than the cost of capital. Thus,  
2 the cost of capital is a hurdle rate for both investors and the firm.

3 **Q 12 Do all investors have the same position in the firm?**

4 A 12 No. Debt investors have a fixed claim on a firm's assets and income that  
5 must be paid prior to any payment to the firm's equity investors. Since  
6 the firm's equity investors have a residual claim on the firm's assets and  
7 income, equity investments are riskier than debt investments. Thus, the  
8 cost of equity exceeds the cost of debt and increases with the  
9 percentage of debt in the firm's capital structure.

10 **Q 13 How do economists define the cost of equity?**

11 A 13 Economists define the cost of equity as the return investors expect to  
12 receive on alternative equity investments of comparable risk. Since the  
13 return on an equity investment of comparable risk is not a contractual  
14 return, the cost of equity is more difficult to measure than the cost of  
15 debt. There is agreement, however, as I have already noted, that:  
16 (1) the cost of equity is greater than the cost of debt; (2) the cost of  
17 equity increases with the percentage of debt in the firm's capital  
18 structure, and (3) the cost of equity, like the cost of debt, is both forward  
19 looking and market based.

20 **Q 14 Does the required rate of return on an investment vary with the risk  
21 of that investment?**

22 A 14 Yes. Since investors are averse to risk, they require a higher rate of  
23 return on investments with greater risk.

1    **Q 15    Are these economic principles regarding the fair return for capital**  
2                    **recognized in any Supreme Court cases?**

3    **A 15    Yes.** These economic principles, relating to the supply of and demand  
4                    for capital, are recognized in two United States Supreme Court cases:  
5                    (1) *Bluefield Water Works and Improvement Co. v. Public Service*  
6                    *Comm'n* ; and (2) *Federal Power Comm'n v. Hope Natural Gas Co.* In  
7                    the *Bluefield Water Works* case, the Court states:

8                    A public utility is entitled to such rates as will permit it to earn  
9                    a return upon the value of the property which it employs for  
10                    the convenience of the public equal to that generally being  
11                    made at the same time and in the same general part of the  
12                    country on investments in other business undertakings which  
13                    are attended by corresponding risks and uncertainties, but it  
14                    has no constitutional right to profits such as are realized or  
15                    anticipated in highly profitable enterprises or speculative  
16                    ventures. The return...should be reasonably sufficient to  
17                    assure confidence in the financial soundness of the utility, and  
18                    should be adequate, under efficient and economical  
19                    management, to maintain and support its credit, and enable it  
20                    to raise the money necessary for the proper discharge of its  
21                    public duties. [*Bluefield Water Works and Improvement Co. v.*  
22                    *Public Service Comm'n.* 262 U.S 679, 692 (1923)].

23                    The Court clearly recognizes here that: (1) a regulated firm cannot  
24                    remain financially sound unless the return it is allowed an opportunity to  
25                    earn on the value of its property is at least equal to the cost of capital  
26                    (the principle relating to the demand for capital); and (2) a regulated firm  
27                    will not be able to attract capital if it does not offer investors an  
28                    opportunity to earn a return on their investment equal to the return they  
29                    expect to earn on other investments of the same risk (the principle  
30                    relating to the supply of capital).

1 In the *Hope Natural Gas* case, the Court reiterates the financial  
2 soundness and capital attraction principles of the *Bluefield* case:

3 From the investor or company point of view it is important that  
4 there be enough revenue not only for operating expenses but  
5 also for the capital costs of the business. These include  
6 service on the debt and dividends on the stock... By that  
7 standard the return to the equity owner should be  
8 commensurate with returns on investments in other  
9 enterprises having corresponding risks. That return,  
10 moreover, should be sufficient to assure confidence in the  
11 financial integrity of the enterprise, so as to maintain its credit  
12 and to attract capital. [*Federal Power Comm'n v. Hope*  
13 *Natural Gas Co.*, 320 U.S. 591, 603 (1944)]

14 **Q 16 What practical difficulties arise when one attempts to apply the**  
15 **economic principles noted above to a regulated firm?**

16 A 16 The application of these principles to the debt and preferred stock  
17 components of a regulated firm's capital structure is straightforward  
18 Several problems arise, however, when the principles are applied to  
19 common equity. These problems stem from the fact that the cash flows  
20 to the equity investors, over any period of time, are not fixed by contract,  
21 and thus are not known with certainty. To induce equity investors to part  
22 with their money, a firm must offer them an expected return that is  
23 commensurate with expected returns on equity investments of similar  
24 risk. The need to measure expected returns makes the application of the  
25 above principles difficult.

26 **Q 17 How do you address these difficulties in your testimony?**

27 A 17 I address these difficulties by employing the comparable company  
28 approach to estimate TAWC's cost of equity.

1    **Q 18    What is the comparable company approach?**

2    A 18    The comparable company approach estimates TAWC's cost of equity by  
3            identifying a group of companies of similar risk. The cost of equity is  
4            then estimated for the companies in the proxy group

5    **IV.    BUSINESS AND FINANCIAL RISKS IN THE WATER UTILITY**  
6            **INDUSTRY**

7    **Q 19    What are the major factors that affect business risk in the water**  
8            **utility industry?**

9    A 19    Business risk in the water utility industry is affected by the following  
10           economic factors

11           1    High Operating Leverage. The water utility business requires a  
12               large commitment to fixed costs in relation to variable costs, a  
13               situation called high operating leverage. The relatively high degree  
14               of fixed costs in the water utility business arises because of the  
15               average water company's large investment in fixed, long-lived water  
16               treatment, storage, and distribution facilities. High operating  
17               leverage causes the average water company's net income to be  
18               highly sensitive to sales fluctuations.

19           2.    Demand Uncertainty. The business risk of the water utility  
20               business is increased by the high degree of demand uncertainty in  
21               the industry Demand uncertainty is caused primarily by: (i) wide  
22               fluctuations in average temperature and rainfall from year to year,  
23               (ii) the state of the economy; and (iii) customer growth in the  
24               service territory

1           3.     Supply Uncertainty. The risk of the water utility business is further  
2                   increased by the need to assure a safe and reliable supply of water  
3                   to meet customer needs on any given day of the year. The Safe  
4                   Drinking Water Act Amendments of 1996 authorize the  
5                   Environmental Protection Agency (EPA) to periodically test the  
6                   drinking water for impurities and to issue regulations requiring water  
7                   utilities to reduce drinking water contaminants to an acceptable  
8                   level. The EPA has exercised its authority by requiring the water  
9                   utilities to meet increasingly stringent drinking water standards over  
10                  time. The rising costs and uncertainty of meeting ever more  
11                  stringent drinking water standards is a major risk facing the water  
12                  utilities.

13                         Water utilities such as TAWC also face the risk of having to  
14                         make major capital expenditures to replace aging facilities and  
15                         expand facilities to meet the water needs of a growing population  
16                         In Tennessee, the uncertain investment costs associated with  
17                         building the facilities to assure reliable supplies of water is  
18                         especially acute. TAWC has already spent considerable sums to  
19                         explore the possibility of building a water pipeline to Louisville.  
20                         Whatever alternative is selected to solve the water shortage  
21                         problem in the Lexington area is likely to require a major investment  
22                         by TAWC. This investment will strain the Company's financial  
23                         resources

1                   Moreover, since September 11, 2001, water companies  
2                   have faced increasing expenditures to secure water plants and  
3                   reservoirs from the possibility of terrorist attempts to contaminate  
4                   the water supply. The uncertainty of future security requirements  
5                   and the cost of meeting these requirements is an additional risk for  
6                   water companies such as TAWC

7   **V.     COST OF EQUITY ESTIMATION METHODS**

8   **Q 20   What methods did you use to estimate the cost of common equity**  
9           **capital for TAWC?**

10  A 20   I used three generally accepted methods for estimating TAWC's cost of  
11           common equity. These are the Discounted Cash Flow (DCF), the ex  
12           ante risk premium, and the ex post risk premium methods. The DCF  
13           method assumes that the current market price of a firm's stock is equal  
14           to the discounted value of all expected future cash flows. The ex ante  
15           risk premium method assumes that an investor's current expectations  
16           regarding the equity risk premium can be estimated from recent data on  
17           the DCF expected rate of return on equity compared to the interest rate  
18           on long-term bonds. The ex post risk premium method assumes that an  
19           investor's current expectations regarding the equity-debt return  
20           differential is equal to the historical record of earned returns on  
21           comparable stock and bond investments. The cost of equity under both  
22           risk premium methods is then equal to the interest rate on the  
23           appropriate bond investments plus the risk premium.

1    **VI.    DISCOUNTED CASH FLOW (DCF) APPROACH**

2    **Q 21    Please describe the DCF model.**

3    A 21    The DCF model is based on the assumption that investors value an  
4            asset on the basis of the future cash flows they expect to receive from  
5            owning the asset.    Thus, investors value an investment in a bond  
6            because they expect to receive a sequence of semi-annual coupon  
7            payments over the life of the bond and a terminal payment equal to the  
8            bond's face value at the time the bond matures    Likewise, investors  
9            value an investment in a firm's stock because they expect to receive a  
10           sequence of dividend payments and, perhaps, expect to sell the stock at  
11           a higher price sometime in the future

12                    A second fundamental principle of the DCF approach is that  
13            investors value a dollar received in the future less than a dollar received  
14            today.    A future dollar is valued less than a current dollar because  
15            investors could invest a current dollar in an interest earning account and  
16            increase their wealth.    This principle is called the time value of money.

17                    Applying the two fundamental DCF principles noted above to an  
18            investment in a bond leads to the conclusion that investors value their  
19            investment in the bond on the basis of the present value of the bond's  
20            future cash flows.    Thus, the price of the bond should reflect the timing,  
21            magnitude, and relative risk of the expected cash flows.    Algebraically  
22            this can be expressed as:

# EQUATION 1

$$P_B = \frac{C}{(1+i)} + \frac{C}{(1+i)^2} + \dots + \frac{C+F}{(1+i)^n}$$

where:

- $P_B$  = Bond price;
- $C$  = Cash value of the constant coupon payment (assumed for notational convenience to occur annually rather than semi-annually),
- $F$  = Face value of the bond;
- $i$  = The rate of interest investors could earn by investing their money in an alternative bond of equal risk, and
- $n$  = The number of periods before the bond matures.

Applying these same principles to an investment in a firm's stock suggests that the price of the stock should be equal to:

# EQUATION 2

$$P_s = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_n + P_n}{(1+k)^n}$$

where

- $P_s$  = Current price of the firm's stock;
- $D_1, D_2, \dots, D_n$  = Expected annual dividend per share on the firm's stock;
- $P_n$  = Price per share of stock at the time the investor expects to sell the stock, and
- $k$  = Return the investor expects to earn on alternative investments of the same risk, i.e., the investor's required rate of return.

Equation (2) is frequently called the annual discounted cash flow model of stock valuation. Assuming that dividends grow at a constant annual rate,  $g$ , this equation can be solved for  $k$ , the cost of equity. The resulting cost of equity equation is  $k = D_1/P_s + g$ , where  $k$  is the cost of



equity,  $D_1$  is the expected next period annual dividend,  $P_s$  is the current price of the stock, and  $g$  is the constant annual growth rate in earnings, dividends, and book value per share. The term  $D_1/P_s$  is called the dividend yield component of the annual DCF model, and the term  $g$  is called the growth component of the annual DCF model. As in the case of the price of a bond, the price of a stock is related to the timing, magnitude, and relative risk of the expected cash flows.

**Q 22 Are you recommending that the annual DCF model be used to estimate TAWC's cost of equity?**

**A 22** No. The DCF model assumes that a company's stock price is equal to the present discounted value of all expected future dividends. The annual DCF model is only a correct expression for the present discounted value of future dividends if dividends are paid annually at the end of each year. Since the companies in my proxy group all pay dividends quarterly, the current market price that investors are willing to pay reflects the expected quarterly receipt of dividends. Therefore, a quarterly DCF model must be used to estimate the cost of equity for these firms. The quarterly DCF model differs from the annual DCF model in that it expresses a company's price as the present discounted value of a quarterly stream of dividend payments. A complete analysis of the implications of the quarterly payment of dividends on the DCF model is provided in Appendix 1. For the reasons cited there, I employed the quarterly DCF model throughout my calculations.

1    **Q 23    Please describe the quarterly DCF model you used.**

2    A 23    The quarterly DCF model I used is described on Schedule A and in  
3            Appendix 1. The quarterly DCF equation shows that the cost of equity is  
4            the sum of the future expected dividend yield and the growth rate, where  
5            the dividend in the dividend yield is the equivalent future value of the four  
6            quarterly dividends at the end of the year, and the growth rate is the  
7            expected growth in dividends or earnings per share

8    **Q 24    In Appendix 1, you demonstrate that the quarterly DCF model**  
9            **provides the theoretically correct valuation of stocks when**  
10          **dividends are paid quarterly. Do investors, in practice, recognize**  
11          **the actual timing and magnitude of cash flows when they value**  
12          **stocks and other securities?**

13    A 24    Yes    In valuing long-term government or corporate bonds, investors  
14            recognize that interest is paid semi-annually. Thus, the price of a long-  
15            term government or corporate bond is simply the present value of the  
16            semi-annual interest and principal payments on these bonds. Likewise,  
17            in valuing mortgages, investors recognize that interest is paid monthly  
18            Thus, the value of a mortgage loan is simply the present value of the  
19            monthly interest and principal payments on the loan. In valuing stock  
20            investments, stock investors correctly recognize that dividends are paid  
21            quarterly. Thus, a firm's stock price is the present value of the stream of  
22            quarterly dividends expected from owning the stock.

1    **Q 25**    **When valuing bonds, mortgages, or stocks, would investors**  
2                    **assume that cash flows are received only at the end of the year,**  
3                    **when, in fact, the cash flows are received semi-annually, quarterly,**  
4                    **or monthly?**

5    A 25    No. Assuming that cash flows are received at the end of the year when  
6                    they are received semi-annually, quarterly, or monthly would lead  
7                    investors to make serious mistakes in valuing investment opportunities  
8                    No rational investor would make the mistake of assuming that dividends  
9                    or other cash flows are paid annually when, in fact, they are paid more  
10                   frequently.

11   **Q 26**    **How did you estimate the growth component of the quarterly DCF**  
12                    **model?**

13   A 26    I used both the average analysts' estimates of future earnings per share  
14                    (EPS) growth reported by I/B/E/S and the estimate of future earnings per  
15                    share growth reported by Value Line.<sup>1</sup>

16   **Q 27**    **What are the analysts' estimates of future EPS growth?**

17   A 27    As part of their research, financial analysts working at Wall Street firms  
18                    periodically estimate EPS growth for each firm they follow. The EPS  
19                    forecasts for each firm are then published. Investors who are  
20                    contemplating purchasing or selling shares in individual companies

1 review the forecasts. These estimates represent five-year forecasts of  
2 EPS growth.

3 **Q 28 What is I/B/E/S?**

4 A 28 I/B/E/S is a firm that reports analysts' EPS growth forecasts for a broad  
5 group of companies. The forecasts are expressed in terms of a mean  
6 forecast and a standard deviation of forecast for each firm. Investors use  
7 the mean forecast as an estimate of future firm performance.

8 **Q 29 Why did you use the I/B/E/S growth estimates?**

9 A 29 The I/B/E/S growth rates: (1) are widely circulated in the financial  
10 community, (2) include the projections of reputable financial analysts who  
11 develop estimates of future EPS growth, (3) are reported on a timely  
12 basis to investors, and (4) are widely used by institutional and other  
13 investors

14 **Q 30 Why did you rely on analysts' projections of future EPS growth in  
15 estimating the investors' expected growth rate rather than looking  
16 at historical growth rates?**

17 A 30 I relied on analysts' projections of future EPS growth because there is  
18 considerable empirical evidence that investors use analysts' forecasts to  
19 estimate future earnings growth.

---

<sup>1</sup> In applying the DCF model, I generally rely on the analysts' estimates reported by I/B/E/S. However, as I discuss in this testimony, the water companies are so small that there are generally only one or two I/B/E/S analysts' long-term growth forecasts available. To supplement the available I/B/E/S growth forecasts, I therefore have also relied on available Value Line earnings growth forecasts for three water companies, including American States, Aqua America, and California Water. Value Line does not have any long-term earnings growth forecasts for other water companies.

1    **Q 31    Have you performed any studies concerning the use of analysts'**  
2            **forecasts as an estimate of investors' expected growth rate, g?**

3    A 31    Yes, I prepared a study in conjunction with Willard T. Carleton, Karl Eller  
4            Professor of Finance at the University of Arizona, on why analysts'  
5            forecasts are the best estimate of investors' expectation of future  
6            long-term growth. This study is described in a paper entitled "Investor  
7            Growth Expectations and Stock Prices: the Analysts versus Historical  
8            Growth Extrapolation," published in the Spring 1988 edition of *The*  
9            *Journal of Portfolio Management*.

10   **Q 32    Please summarize the results of your study.**

11   A 32    First, we performed a correlation analysis to identify the historically  
12            oriented growth rates which best described a firm's stock price. Then we  
13            did a regression study comparing the historical growth rates with the  
14            average analysts' forecasts. In every case, the regression equations  
15            containing the average of analysts' forecasts statistically outperformed  
16            the regression equations containing the historical growth estimates  
17            These results are consistent with those found by Cragg and Malkiel, the  
18            early major research in this area (John G. Cragg and Burton G. Malkiel,  
19            *Expectations and the Structure of Share Prices*, University of Chicago  
20            Press, 1982). These results are also consistent with the hypothesis that  
21            investors use analysts' forecasts, rather than historically oriented growth  
22            calculations, in making stock buy and sell decisions. They provide  
23            overwhelming evidence that the analysts' forecasts of future growth are

1 superior to historically oriented growth measures in predicting a firm's  
2 stock price.

3 **Q 33 What price did you use in your DCF model?**

4 A 33 I used a simple average of the monthly high and low stock prices for  
5 each firm for the three-month period ending January 2004. These high  
6 and low stock prices were obtained from the Standard & Poor's *Stock*  
7 *Guide*, a source generally available to and used by investors.

8 **Q 34 Why did you use the three-month average stock price in applying**  
9 **the DCF method?**

10 A 34 I used the three-month average stock price in applying the DCF method  
11 because stock prices fluctuate daily, while financial analysts' forecasts  
12 for a given company are generally changed less frequently, often on a  
13 quarterly basis. Thus, to match the stock price with an earnings forecast,  
14 it is appropriate to average stock prices over a three-month period.

15 **Q 35 Did you include an allowance for flotation costs in your DCF**  
16 **analysis?**

17 A 35 Yes. I have included a five percent allowance for flotation costs in my  
18 DCF calculations.

19 **Q 36 Please explain your inclusion of flotation costs.**

20 A 36 All firms that have sold securities in the capital markets have incurred  
21 some level of flotation costs, including underwriters' commissions, legal  
22 fees, printing expense, etc. These costs are withheld from the proceeds  
23 of the stock sale or are paid separately, and must be recovered over the

1 life of the equity issue. Costs vary depending upon the size of the issue,  
2 the type of registration method used and other factors, but in general  
3 these costs range between three and five percent of the proceeds from  
4 the issue [see Lee, Inmoo, Scott Lochhead, Jay Ritter, and  
5 Quanshui Zhao, "The Costs of Raising Capital," *The Journal of Financial*  
6 *Research*, Vol. XIX No 1 (Spring 1996), 59-74, and Clifford W Smith,  
7 "Alternative Methods for Raising Capital," *Journal of Financial Economics*  
8 5 (1977) 273-307]. In addition to these costs, for large equity issues (in  
9 relation to outstanding equity shares), there is likely to be a decline in  
10 price associated with the sale of shares to the public. On average, the  
11 decline due to market pressure has been estimated at two to  
12 three percent [see Richard H. Pettway, "The Effects of New Equity Sales  
13 Upon Utility Share Prices," *Public Utilities Fortnightly*, May 10, 1984,  
14 35—39]. Thus, the total flotation cost, including both issuance expense  
15 and market pressure, could range anywhere from five to eight percent of  
16 the proceeds of an equity issue I believe a combined five percent  
17 allowance for flotation costs is a conservative estimate that should be  
18 used in applying the DCF model in this proceeding.

19 **Q 37 Does TAWC issue equity in the capital markets?**

20 **A 37** No. Although TAWC does not issue equity in the capital markets, its  
21 parent, RWE, must issue equity to provide TAWC the necessary  
22 financing to make investments in its water supply operations in

1 Tennessee. If the parent is not able to recover its flotation costs through  
2 TAWC's rates, it will have no incentive to invest in TAWC.

3 **Q 38 Is a flotation cost adjustment only appropriate if a company issues**  
4 **stock during the test year?**

5 A 38 No. As described in Appendix 2, a flotation cost adjustment is required  
6 whether or not a company issued new stock during the test year.  
7 Previously incurred flotation costs have not been recovered in previous  
8 rate cases; rather, they are a permanent cost associated with past issues  
9 of common stock. Just as an adjustment is made to the embedded cost  
10 of debt to reflect previously incurred debt issuance costs (regardless of  
11 whether additional bond issuances were made in the test year), so  
12 should an adjustment be made to the cost of equity regardless of  
13 whether additional stock was issued during the test year.

14 **Q 39 Does an allowance for recovery of flotation costs associated with**  
15 **stock sales in prior years constitute retroactive rate-making?**

16 A 39 No. An adjustment for flotation costs on equity is not meant to recover  
17 any cost that is properly assigned to prior years. In fact, the adjustment  
18 allows TAWC to recover only the current carrying costs associated with  
19 flotation expenses incurred at the time stock sales were made. The  
20 original flotation costs themselves will never be recovered, because the  
21 stock is assumed to have an infinite life.

22 **Q 40 How did you apply the DCF approach to obtain the cost of equity**  
23 **capital for TAWC?**



1 A 40 I applied the DCF approach to the publicly-traded water companies  
2 shown on Schedule A and the publicly-traded natural gas distribution  
3 companies (LDCs) shown on Schedule B

4 **Q 41 How did you select your group of publicly-traded water companies?**

5 A 41 I selected all the water companies included in either the Value Line  
6 Investment Survey that: (1) paid dividends during every quarter of the  
7 last five years; (2) did not decrease dividends during any quarter of the  
8 past five years, (3) have at least one analyst's long-term growth forecast;  
9 and (4) have not announced a merger. In addition, all of the companies  
10 included in my group have a Value Line Safety Rank of 2 or 3, where 3 is  
11 the average Safety Rank of the Value Line universe of companies and 2  
12 is above average in safety. The average DCF result for my proxy group  
13 of water companies is also shown on Schedule A.

14 **Q 42 Why did you eliminate companies that have either decreased or**  
15 **eliminated their dividend in the past five years?**

16 A 42 The DCF model requires the assumption that dividends will grow at a  
17 constant rate into the indefinite future. If a company has either  
18 decreased or eliminated its dividend in recent years, an assumption that  
19 the company's dividend will grow at the same rate into the indefinite  
20 future is questionable

21 **Q 43 Why did you eliminate companies that do not have any analyst's**  
22 **long-term growth forecasts?**

1 A 43 As noted above, my studies indicate that the analysts' growth forecasts  
2 best approximate the growth forecasts used by investors in making stock  
3 buy and sell decisions, and thus, the average of the analysts' growth  
4 forecast is the best available estimate of the growth term in the DCF  
5 Model. In my opinion, it is difficult to apply the DCF model to companies  
6 that do not have any analysts' long-term growth estimates.

7 **Q 44 Are water companies widely followed by analysts in the investment**  
8 **community?**

9 A 44 No. As a result of their small size and low investor turnover, the water  
10 companies are generally followed by very few analysts. The number of  
11 analysts' estimates for each of the water companies in Dr. Vander  
12 Weide's proxy group is shown below in Table 1:

13 **Table 1**

14 **NUMBER OF LONG-TERM GROWTH FORECASTS FOR WATER COMPANIES**

Company	No of I/B/E/S Analysts	No of Value Line Analysts
American States Water	1	1
Aqua America	5	1
California Water	2	1
Middlesex Water	0	0
Southwest Water	2	0
York Water Company	1	0
Connecticut Water Services	0	0
SJW Corp	0	0

15 **Q 45 Do you normally include companies in your proxy groups that have**  
16 **only one or two analysts' long-term growth forecasts?**

17 A 45 No. I normally include a company in my proxy group only if there are at  
18 least three analysts' estimates of long-term growth. On the basis of my

1 professional judgment, I believe that cost of equity estimates based on  
2 three or more analysts' estimates are more reliable than cost of equity  
3 estimates based on just one or two forecasts.

4 **Q 46 Recognizing the greater uncertainty associated with DCF results**  
5 **based on just one or two analysts' forecasts, did you supplement**  
6 **your DCF results for the water companies with a DCF analysis of an**  
7 **additional proxy group?**

8 A 46 Yes. Given the greater uncertainty in applying the DCF model to  
9 companies with only one or two analysts' growth forecasts, as noted  
10 above, I have also applied the DCF model to an additional proxy group  
11 consisting of LDCs, and each of the companies in the LDC proxy group  
12 has at least three analysts' estimates of long-term growth

13 **Q 47 You noted above that you also eliminate from your proxy groups**  
14 **companies that have announced mergers. Why do you eliminate**  
15 **companies that have announced mergers that are not yet**  
16 **completed?**

17 A 47 A merger announcement can sometimes have a significant impact on a  
18 company's stock price because of anticipated merger-related cost  
19 savings and new market opportunities. Analysts' growth forecasts, on  
20 the other hand, are necessarily related to companies as they currently  
21 exist, and do not reflect investors' views of the potential cost savings and  
22 new market opportunities associated with mergers. The use of a stock  
23 price that includes the value of potential mergers in conjunction with

1 growth forecasts that do not include the growth enhancing prospects of  
2 potential mergers produces DCF results that tend to distort a company's  
3 cost of equity

4 **Q 48 What companies were eliminated from your water company proxy**  
5 **group by your selection criteria?**

6 A 48 Connecticut Water Services, Middlesex, and SJW Corp. were eliminated  
7 from my proxy group because they have no analysts' forecasts of long-  
8 term growth. No water companies were eliminated because of other  
9 selection criteria.

10 **Q 49 Please summarize the result of your application of the DCF model**  
11 **to your water company proxy group.**

12 A 49 As shown in Schedule A, my application of the DCF model to the Value  
13 Line water companies produces an average DCF result of 10.9 percent.

14 **Q 50 You noted above that you also applied your DCF method to a proxy**  
15 **group of LDCs. Why did you apply your DCF model to a proxy**  
16 **group of LDCs?**

17 A 50 I applied my DCF model to a proxy group of LDCs because (1) the  
18 companies in the water company group are generally followed by only  
19 one or two analysts; (2) the LDCs are similar in risk to the water  
20 companies; and (3) it is useful to examine the cost of equity results for a  
21 larger group of companies of similar risk that have a wider following in  
22 the investment community in order to test the reasonableness of the  
23 results obtained by applying cost of equity methodologies to the small

1 group of publicly-traded water companies Financial theory does not  
2 require that companies be in exactly the same industry to be comparable  
3 in risk

4 **Q 51 How did you select your proxy group of LDCs?**

5 A 51 I selected all the companies in Value Line's natural gas industry groups  
6 that: (1) are primarily in the business of natural gas distribution, (2) paid  
7 dividends during every quarter of the last five years, (3) did not decrease  
8 dividends during any quarter of the past five years, (4) had at least  
9 three analysts included in the I/B/E/S consensus growth forecast, and  
10 (5) have not announced a merger. In addition, all of the LDCs included  
11 in my group have a Value Line Safety Rank of 1, 2, or 3. The LDCs in  
12 my DCF proxy group and the average DCF result are shown on  
13 Schedule B.

14 **Q 52 Which LDCs did you eliminate according to your criteria?**

15 A 52 I eliminated Cascade, Energen, Laclede, New Jersey Resources, NUI,  
16 South Jersey, Southwest Gas, and UGI because they have fewer than  
17 three analyst's growth forecasts. Southern Union was not included  
18 because it pays no dividends; and NUI and SEMCO were eliminated  
19 because they have reduced their dividend payments

20 **Q 53 How are the LDCs similar to TAWC?**

21 A 53 Like TAWC, the LDCs are regulated public utilities that (1) invest  
22 primarily in a capital-intensive physical network that connects the  
23 customer to the source of supply; and (2) sell their products and services

1 at regulated rates to customers whose demand is primarily dependent on  
2 weather and the state of the economy.

3 **Q 54 Does your LDC proxy group meet the standards of the *Hope* and**  
4 ***Bluefield* cases you cite above?**

5 A 54 Yes. The *Hope* and *Bluefield* standard states that a public utility should  
6 be allowed to earn a return on its investment that is commensurate with  
7 the returns investors are able to earn on investments having similar risk.  
8 The LDCs are a group of companies that meet the standards of the *Hope*  
9 and *Bluefield* cases because they are similar in risk to TAWC.

10 **Q 55 Do you have any empirical evidence that the LDCs in your proxy**  
11 **group are a reasonable proxy for TAWC?**

12 A 55 Yes. The average Value Line Safety Rank for my proxy group of LDCs is  
13 slightly less than 2, on a scale where 1 is the most safe and 5 is the least  
14 safe, whereas the water companies have an average Value Line Safety  
15 Rank of approximately 3.

16 **Q 56 Please summarize the results of your application of the DCF**  
17 **method to the LDC proxy group.**

18 A 56 My application of the DCF method to the LDC proxy group produces an  
19 average DCF result of 10.4 percent, as shown on Schedule B.

20 **Q 57 You have presented the results of two DCF analyses. Based on**  
21 **your DCF studies, what is your conclusion regarding TAWC's**  
22 **DCF-based cost of equity?**

1 A 57 My application of the DCF model produces an average DCF result of  
2 10.9 percent for the water companies and 10 4 percent for the LDCs.

3 **VII. RISK PREMIUM APPROACH**

4 **Q 58 Please describe the risk premium approach to estimating TAWC's**  
5 **cost of equity.**

6 A 58 The risk premium approach is based on the principle that investors  
7 expect to earn a return on an equity investment in TAWC that reflects a  
8 "premium" over and above the return they expect to earn on an  
9 investment in a portfolio of long-term bonds. This equity risk premium  
10 compensates equity investors for the additional risk they bear in making  
11 equity investments versus bond investments.

12 **Q 59 How did you measure the required risk premium on an equity**  
13 **investment in TAWC?**

14 A 59 I used two methods to estimate the required risk premium on an equity  
15 investment in TAWC. The first is called the ex ante risk premium method  
16 and the second is called the ex post risk premium method.

17 **A. Ex Ante Risk Premium Approach**

18 **Q 60 Please describe your ex ante risk premium approach for measuring**  
19 **the required risk premium on an equity investment in TAWC.**

20 A 60 My ex ante risk premium method is based on a study of the DCF  
21 expected return on a proxy group of natural gas distribution companies  
22 compared to the interest rate on Moody's A-rated utility bonds.

Specifically, for each month in my 72-month study period, I calculated the risk premium using the equation,

$$RP_{\text{PROXY}} = DCF_{\text{PROXY}} - I_A$$

where:

$RP_{\text{PROXY}}$  = the required risk premium on an equity investment in the proxy group of LDCs;

$DCF_{\text{PROXY}}$  = average DCF estimated cost of equity on a portfolio of proxy LDCs; and

$I_A$  = the yield to maturity on an investment in A-rated utility bonds.

I utilized a 72-month period because this was as far back as I could readily obtain data.

**Q 61 Why did you apply your ex ante risk premium study to LDCs rather than to water companies?**

A 61 I applied my ex ante risk premium approach to LDCs rather than to water companies because the LDCs are similar in risk to the water companies and there is sufficient data to apply the DCF method to the sample companies over a relatively long period of time. In contrast, as discussed above, the water companies, are generally followed by only one or two analysts, and there are relatively few companies with consistent data extending back for a reasonably long study period.

**Q 62 What were the results of your ex ante risk premium study?**

A 62 The results of my ex ante risk premium study are described in Schedule C. Over the study period, the average DCF estimated cost of equity on an investment in the portfolio of LDCs was equal to 12.09 percent, while the average yield to maturity on A-rated utility bonds



1 was 7.38 percent. Thus, the average estimated risk premium on an  
2 investment in TAWC was 4.71 percent over the yield on A-rated utility  
3 bonds

4 **Q 63 Does the ex ante risk premium vary with the level of interest rates?**

5 A 63 Yes. Previous studies have shown that the ex ante risk premium tends  
6 to vary inversely with the level of interest rates, that is, the risk premium  
7 tends to increase when interest rates decline, and decrease when  
8 interest rates go up.

9 **Q 64 Have you performed a statistical analysis to determine whether this**  
10 **inverse relationship holds for your ex ante risk premium data?**

11 A 64 Yes I performed a regression analysis of the relationship between the  
12 ex ante risk premium and the yield to maturity on A-rated utility bonds,  
13 using the equation,

$$14 \qquad \qquad \qquad RP_{\text{PROXY}} \qquad = \qquad a + b \times I_A + e$$

15 where

16  $RP_{\text{PROXY}}$  = risk premium on portfolio of LDCs;

17  $I_A$  = yield to maturity on A-rated utility bonds;

18  $e$  = a random residual, and

19  $a, b$  = coefficients estimated by the regression procedure.

20 **Q 65 Regression analysis assumes that the statistical residuals from the**  
21 **regression equation are random. Did you examine whether this**  
22 **assumption is valid for your data?**

23 A 65 Yes. My examination of the residuals revealed that there is a significant  
24 probability that the residuals are serially correlated (non-zero serial

1 correlation indicates that the residual in one time period tends to be  
2 correlated with the residual in the previous time period).

3 **Q 66 Did you make any adjustments in your data to correct for the**  
4 **possibility of serial correlation in the residuals?**

5 A 66 Yes. The common procedure for dealing with serial correlation in the  
6 residuals is to estimate the regression coefficients in two steps. First, a  
7 multiple regression analysis is used to estimate the serial correlation  
8 coefficient,  $r$ . Second, the estimated serial correlation coefficient is used  
9 to transform the original variables into new variables whose serial  
10 correlation is approximately zero. The regression coefficients are then  
11 re-estimated using the transformed variables as inputs in the regression  
12 equation. This procedure produced  $a$  and  $b$  coefficient estimates equal  
13 to 8.00 and  $-0.45$ , indicating that the risk premium increases by 45 basis  
14 points for every 100 basis point decrease in the interest rate on A-rated  
15 utility bonds.

16 **Q 67 Using your knowledge of the statistical relationship between the**  
17 **yield to maturity on A-rated utility bonds and the required risk**  
18 **premium, what is your estimate of the ex ante risk premium on an**  
19 **investment in TAWC?**

20 A 67 As noted above, my estimate of the ex ante risk premium on an  
21 investment in TAWC as compared to an investment in A-rated utility  
22 bonds is given by the equation

$$23 \quad RP_{\text{PROXY}} = 8.00 - 0.45 \times I_A.$$

1 Using the 6.31 percent three-month average yield to maturity on A-rated  
2 utility bonds at March, April, and May 2004, the regression equation  
3 produces an ex ante risk premium equal to 5.16 percent ( $8.00 - 0.45 \times$   
4  $6.31 = 5.16$ ).

5 **Q 68 What range of risk premiums did you obtain in your ex ante risk**  
6 **premium study?**

7 A 68 As shown on Vander Weide Schedule C, my study shows a range of risk  
8 premiums on a portfolio of LDC stock investments versus a portfolio of A-  
9 rated utility bonds of approximately 340 to 580 basis points.

10 **Q 69 What cost of equity do you obtain from your ex ante risk premium**  
11 **approach?**

12 A 69 To estimate the cost of equity using the ex ante risk premium approach,  
13 one may add the estimated risk premium over the yield on A-rated utility  
14 bonds to the yield to maturity on A-rated utility bonds. The average yield  
15 to maturity on A-rated utility bonds for the three-month period ending  
16 May 2004 was 6.31 percent. As noted above, my analyses produce an  
17 estimated risk premium over the yield on A-rated utility bonds equal to  
18 5.16 percent. Adding an estimated risk premium of 5.16 percent to the  
19 6.31 percent yield to maturity on A-rated utility bonds produces a cost of  
20 equity estimate of 11.47 percent using the ex ante risk premium  
21 approach.

## **B. Ex Post Risk Premium Approach**

**Q 70 Please describe your ex post risk premium approach for measuring the required risk premium on an equity investment in TAWC.**

**A 70** I first performed a study of the comparable returns received by bond and stock investors over the last 67 years. I estimated the returns on stock and bond portfolios, using stock price and dividend yield data on the S&P 500 and bond yield data on Moody's A-rated Utility Bonds. My study consisted of making an investment of one dollar in the S&P 500 and Moody's A-rated Utility Bonds at the beginning of 1937, and reinvesting the principal plus return each year to 2004. The return associated with each stock portfolio is the sum of the annual dividend yield and capital gain (or loss) which accrued to this portfolio during the year(s) in which it was held. The return associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrued to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year between 1937 and 2004 are shown on Schedule D. The average annual return on an investment in the S&P 500 stock portfolio was 11.67 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio was 6.40 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 5.27 percent.

1 I also conducted a second study using stock data on the  
2 S&P Utilities rather than the S&P 500. As shown on Schedule E, the  
3 S&P Utility stock portfolio showed an average annual return of  
4 10.57 percent per year. Thus, the return on the S&P Utility stock  
5 portfolio exceeded the return on the Moody's A-rated utility bond  
6 portfolio by 4.16 percent (apparent discrepancy due to rounding).

7 **Q 71 Why is it appropriate to perform your ex post risk premium analysis**  
8 **using both the S&P 500 and the S&P Utility Stock indices?**

9 A 71 I have performed my ex post risk premium analysis on both the S&P 500  
10 and the S&P Utilities as upper and lower bounds for the required risk  
11 premium on an equity investment in TAWC because I believe TAWC  
12 faces risks today that are somewhere in between the average risk of the  
13 S&P Utilities and the S&P 500 over the years 1937 to 2004. Specifically,  
14 the risk premium on the S&P Utilities, 4.16 percent, represents a lower  
15 bound for the required risk premium on an equity investment in TAWC  
16 because TAWC is currently more risky than an investment in the average  
17 utility in the S&P Utilities index over the entire period 1936 to the present.  
18 On the other hand, the risk premium on the S&P 500, 5.27 percent,  
19 represents an upper bound because an investment in TAWC is less risky  
20 than an investment in the S&P 500 over the period 1937 to the present. I  
21 use the average of the two risk premiums as my estimate of the required  
22 risk premium for TAWC in my ex post risk premium approach.

1    **Q 72    Why did you analyze investors' experiences over such a long time**  
2                    **frame?**

3    A 72    Because day-to-day stock price movements can be somewhat random, it  
4                    is inappropriate to rely on short-run movements in stock prices in order to  
5                    derive a reliable risk premium. Rather than buying and selling frequently  
6                    in anticipation of highly volatile price movements, most investors employ  
7                    a strategy of buying and holding a diversified portfolio of stocks. This  
8                    buy-and-hold strategy will allow an investor to achieve a much more  
9                    predictable long-run return on stock investments and at the same time  
10                   will minimize transaction costs. The situation is very similar to the  
11                   problem of predicting the results of coin tosses. I cannot predict with any  
12                   reasonable degree of accuracy the result of a single, or even a few, flips  
13                   of a balanced coin; but I can predict with a good deal of confidence that  
14                   approximately 50 heads will appear in 100 tosses of this coin. Under  
15                   these circumstances, it is most appropriate to estimate future experience  
16                   from long-run evidence of investment performance.

17   **Q 73    Would your study provide a different ex post risk premium if you**  
18                    **started with a different time period?**

19   A 73    Yes. The ex post risk premium results do vary somewhat depending on  
20                   the historical time period chosen. My policy was to go back as far in  
21                   history as I could get reliable data. I thought it would be most meaningful  
22                   to begin after the passage and implementation of the Public Utility  
23                   Holding Company Act of 1935. This Act significantly changed the

1 structure of the public utility industry. Since the Public Utility Holding  
2 Company Act of 1935 was not implemented until the beginning of 1937, I  
3 felt that numbers taken from before this date would not be comparable to  
4 those taken after.

5 **Q 74 Why was it necessary to examine the yield from debt investments in**  
6 **order to determine the investors' required rate of return on equity**  
7 **capital?**

8 A 74 As previously explained, investors expect to earn a return on their equity  
9 investment that exceeds currently available bond yields. This is because  
10 the return on equity, being a residual return, is less certain than the yield  
11 on bonds and investors must be compensated for this uncertainty  
12 Second, the investors' current expectations concerning the amount by  
13 which the return on equity will exceed the bond yield will be strongly  
14 influenced by historical differences in returns to bond and stock  
15 investors. For these reasons, we can estimate investors' current  
16 expected returns from an equity investment from knowledge of current  
17 bond yields and past differences between returns on stocks and bonds

18 **Q 75 Has there been any significant trend in the ex post equity risk**  
19 **premium over the 1937 to 2004 time period of your study?**

20 A 75 No. Statisticians test for trends in data series by regressing the data  
21 observations against time. I have performed such a time series  
22 regression on my two data sets of historical risk premiums. As shown  
23 below in Tables 2 and 3, there is no statistically significant trend in my

1 risk premium data. Indeed, the coefficient on the time variable is  
2 insignificantly different from zero (if there were a trend, the coefficient on  
3 the time variable should be significantly different from zero).

**TABLE 2**  
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P 500**

Line No		Intercept	Time	Adjusted R Square	F
1	Coefficient	0 015	0 001	0 002	1 124
2	T Statistic	0 354	1 060		

**TABLE 3**  
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P UTILITIES**

Line No		Intercept	Time	Adjusted R Square	F
1	Coefficient	0 007	0 001	0 002	1 136
2	T Statistic	0 195	1 066		

4 **Q 76 Do you have any other evidence that there has been no significant**  
5 **trend in ex post risk premium results over time?**

6 A 76 Yes. The Ibbotson Associates' *2004 Yearbook* contains an analysis of  
7 "trends" in historical risk premium data. Ibbotson Associates uses  
8 correlation analysis to determine if there is any pattern or "trend" in risk  
9 premiums over time. They also conclude that there are no trends in risk  
10 premiums over time.

11 **Q 77 What is the significance of the evidence that historical risk**  
12 **premiums have no trend or other statistical pattern over time?**

13 A 77 The significance of this evidence is that the average historical risk  
14 premium is a good estimate of the future expected risk premium. As  
15 Ibbotson notes:



1           The significance of this evidence is that the realized equity risk  
2           premium next year will not be dependent on the realized equity  
3           risk premium from this year. That is, there is no discernable  
4           pattern in the realized equity risk premium—it is virtually  
5           impossible to forecast next year's realized risk premium based  
6           on the premium of the previous year. For example, if this year's  
7           difference between the riskless rate and the return on the stock  
8           market is higher than last year's, that does not imply that next  
9           year's will be higher than this year's. It is as likely to be higher  
10          as it is lower. The best estimate of the expected value of a  
11          variable that has behaved randomly in the past is the average (or  
12          arithmetic mean) of its past values. [Ibbotson Associates'  
13          Valuation Edition 2004 Yearbook, page 75.]

14   **Q 78   You noted that Ibbotson Associates also provides historical risk**  
15           **premium data. How do the Ibbotson Associates' risk premiums**  
16           **compare to your risk premiums?**

17   **A 78   Ibbotson Associates obtains a 7.2 percent risk premium on the S&P 500**  
18           **versus long-term government bonds. Since the yield on long-term**  
19           **government bonds is currently approximately 115 basis points less than**  
20           **the yield on A-rated utility bonds, the Ibbotson Associates' data would**  
21           **indicate an approximate 6.05 percent risk premium on the S&P 500 over**  
22           **A-rated utility bonds. As shown on Schedules D and E, my studies**  
23           **produce a risk premium over A-rated utility bonds in the range of**  
24           **4.16 percent to 5.27 percent.**

25   **Q 79   What conclusions do you draw from your ex post risk premium**  
26           **analyses about the required return on an equity investment in**  
27           **TAWC?**

28   **A 79   My own studies, combined with my analysis of other studies, provide**  
29           **strong evidence that investors today require an equity return of**

1 approximately 4.16 to 5.27 percentage points above the expected yield  
2 on A-rated utility bonds. The average interest rate on Moody's A-rated  
3 utility bonds for the three-month period March through May 2004 has  
4 ranged from 5.97 percent to 6.62 percent. On the basis of this  
5 information and my knowledge of current market conditions, I conclude  
6 that investors would expect a long-term yield of approximately  
7 6.3 percent on A-rated utility bonds. Adding a 4.16 to 5.27 percentage  
8 point risk premium to an expected yield of 6.3 percent on A-rated utility  
9 bonds, I obtain an expected return on equity in the range 10.4 percent to  
10 11.6 percent, with a midpoint of 11.0 percent. Adding a 25 basis-point  
11 allowance for flotation costs,<sup>2</sup> I obtain an estimate of 11.3 percent as the  
12 cost of equity for TAWC using the ex post risk premium method.

#### 13 **VIII. FAIR RATE OF RETURN ON EQUITY**

14 **Q 80 Please summarize your findings concerning TAWC's cost of equity.**

15 **A 80** My DCF analysis suggests that TAWC's cost of equity is in the range  
16 10.4 percent to 10.9 percent. My ex ante risk premium approach  
17 produces a cost of equity estimate for TAWC of 11.5 percent. From my  
18 ex post risk premium approach, I find that the cost of equity is  
19 11.3 percent. Based on my three recommended methodologies, I  
20 conclude that the average cost of equity for the companies in my proxy  
21 groups is in the range 10.4 percent to 11.5 percent.

---

<sup>2</sup> I determined the flotation cost allowance by calculating the difference in my DCF results with and without a flotation cost allowance.

1    **Q 81**    **Does your 10.4 percent to 11.5 percent cost of equity range for your**  
2                    **proxy groups depend on the percentages of debt and equity in your**  
3                    **proxy companies' average capital structure?**

4    A 81    Yes. The 10 4 percent to 11.5 percent cost of equity range for my proxy  
5                    group reflects the financial risk associated with my proxy companies'  
6                    average capital structure, where the capital structure weights are  
7                    measured in terms of market values. Since financial leverage, that is,  
8                    the use of debt financing, increases the risk of investing in the proxy  
9                    companies' equity, the cost of equity would be higher for a company with  
10                  a capital structure containing more leverage.

11   **Q 82**    **What are the average percentages of debt and equity in your proxy**  
12                    **companies' capital structures?**

13   A 82    My proxy group of water companies has an average capital structure  
14                    containing 4.65 percent short-term debt, 28.02 percent long-term debt,  
15                    0.09 percent preferred stock, and 67 24 percent common equity. My  
16                    proxy group of LDCs has an average capital structure containing  
17                    9.46 percent short-term debt, 32.13 percent long-term debt, 0 39 percent  
18                    preferred stock, and 58.02 percent common equity. These data are  
19                    shown in Schedule F.

20   **Q 83**    **How does the average capital structure of your proxy companies**  
21                    **compare to TAWC's pro forma capital structure at the end of the**  
22                    **test year?**

1 A 83 As described in the testimony of Company Witness Miller, TAWC's pro  
2 forma capital structure at the end of the test year contains 5.34 percent  
3 short-term debt, 48.88 percent long-term debt, 1.59 percent preferred  
4 stock, and 44.19 percent common equity. Thus, TAWC's pro forma  
5 capital structure is significantly more highly leveraged than the average  
6 capital structure of my proxy companies.

7 **Q 84 You mentioned earlier that the cost of equity depends on a**  
8 **company's capital structure. Is there any way to adjust the**  
9 **10.4 percent to 11.5 percent cost of equity range for your proxy**  
10 **companies to reflect the higher leverage in TAWC's capital**  
11 **structure?**

12 A 84 Yes. Since my proxy groups are comparable in risk to TAWC, TAWC  
13 should have the same weighted average cost of capital as my proxy  
14 companies. It is a simple matter to determine what cost of equity TAWC  
15 should have in order to have the same weighted average cost of capital  
16 as my proxy companies. Since TAWC's capital structure contains  
17 significantly more leverage than the average capital structure of my  
18 proxy companies, and the cost of equity increases with leverage, it is  
19 evident that such an adjustment would produce a significantly higher cost  
20 of equity range for TAWC.

21 **Q 85 What is your recommendation as to a fair rate of return on common**  
22 **equity for TAWC?**

1 A 85 I conservatively recommend that TAWC be allowed a fair rate of return  
2 on common equity in the range 10.4 percent to 11.5 percent.

3 **Q 86 Does this conclude your testimony?**

4 A 86 Yes, it does.

## LIST OF SCHEDULES AND APPENDICES

- Schedule A Summary of Discounted Cash Flow Analysis for Value Line Water Companies
- Schedule B Summary of Discounted Cash Flow Analysis for Value Line Natural Gas Distribution Companies
- Schedule C Comparison of DCF Expected Return on an Equity Investment in Natural Gas Distribution Companies to the Interest Rate on A-rated Utility Bonds
- Schedule D Comparative Returns on S&P 500 Stock Index and Moody's A-Rated Bonds 1937—2004
- Schedule E Comparative Returns on S&P Utility Stocks and Moody's A-Rated Bonds 1937—2004
- Schedule F Average Capital Structure of Proxy Company Groups
  
- Appendix 1 Derivation of the Quarterly DCF Model
- Appendix 2 Adjusting for Flotation Costs in Determining a Public Utility's Allowed Rate of Return on Equity
- Appendix 3 Risk Premium Approach

**TENNESSEE-AMERICAN WATER COMPANY  
SCHEDULE A  
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS  
FOR PROXY WATER COMPANY COMPANIES**

Line No	Company	Dividend	Price	Value Line Forecasted EPS Growth	I/B/E/S Growth	Ave I/B/E/S & Value Line	Cost of Equity
1	American States Water	0 221	23 752	9 5%	3 0%	6 3%	10 6%
2	Aqua America	0 120	20 653	9 5%	9 0%	9 3%	12 0%
3	California Water	0 283	28 437	11 0%	4 0%	7.5%	12 2%
4	Southwest Water	0 048	13 545		8 0%	8 0%	9 6%
5	York Water Company	0 145	20 058		7 0%	7 0%	10 2%
6	Average <sup>3</sup>						10 9%

**Notes**

- $d_1, d_2, d_3, d_4$  = Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per *Value Line* by the factor  $(1 + g)$
- $P_0$  = Average of the monthly high and low stock prices during the three months ending May 2004 per S&P Stock Guide
- FC = Flotation costs expressed as a percent of gross proceeds
- $g$  = Average of I/B/E/S and Value Line forecasts of future earnings growth May 2004
- $k$  = Cost of equity using the quarterly version of the DCF model shown by the formula below

$$k = \frac{d_1(1+k)^{75} + d_2(1+k)^{50} + d_3(1+k)^{25} + d_4}{P_0(1-FC)} + g$$

<sup>3</sup>

It is generally more appropriate to refer to a market value weighted average result, as I do in reporting the average result for the proxy group of LDCs. However, one company in the water company group, Aqua America, is four times as large as the next largest company and 15 times larger than the smallest company. Thus, referring to a market-weighted average result would effectively cause a market-weighted average result to depend primarily on the result for a single company, Aqua America, which, in this case, has the highest DCF result. I therefore conservatively report a simple average of the DCF results for all the water companies. The market-weighted average DCF result for the water companies is 11 6%.

**TENNESSEE-AMERICAN WATER COMPANY  
SCHEDULE B  
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS  
FOR NATURAL GAS DISTRIBUTION COMPANIES**

Line No	Company	Dividend	Price	Growth	Cost of Equity
1	AGL Resources	0.280	28.245	4.80%	9.3%
2	Atmos Energy	0.305	25.132	6.67%	12.3%
3	Equitable Resources	0.300	45.367	9.33%	12.5%
4	KeySpan Corp.	0.445	36.773	4.89%	10.4%
5	NICOR Inc	0.465	34.615	3.25%	9.3%
6	Northwest Nat Gas	0.325	30.333	4.88%	9.7%
7	Peoples Energy	0.540	42.802	4.50%	10.2%
8	Piedmont	0.430	40.993	4.80%	9.5%
9	WGL Holdings Inc	0.325	28.835	3.93%	9.0%
10	Market Weighted Average				10.4%

Notes

- $d_1, d_2, d_3, d_4$  = Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per *Value Line* by the factor  $(1 + g)$
- $P_0$  = Average of the monthly high and low stock prices during the three months ending May 2004 per S&P Stock Guide
- FC = Flotation costs expressed as a percent of gross proceeds
- $g$  = I/B/E/S forecast of future earnings growth May 2004
- $k$  = Cost of equity using the quarterly version of the DCF model shown by the formula below

$$k = \frac{d_1(1+k)^{75} + d_2(1+k)^{50} + d_3(1+k)^{25} + d_4}{P_0(1-FC)} + g$$



**TENNESSEE-AMERICAN WATER COMPANY  
SCHEDULE C  
COMPARISON OF DCF EXPECTED RETURN  
ON AN EQUITY INVESTMENT IN NATURAL GAS DISTRIBUTION COMPANIES  
TO THE INTEREST RATE ON A-RATED UTILITY BONDS**

Date	DCF	A-Bond Yield	Risk Premium
June-98	0 1105	0 0703	0 0402
July-98	0 1130	0 0703	0 0427
August-98	0 1202	0 0700	0 0502
September-98	0 1255	0 0693	0 0562
October-98	0 1256	0 0696	0 0560
November-98	0 1197	0 0703	0 0494
December-98	0 1159	0 0691	0 0468
January-99	0 1176	0 0697	0 0479
February-99	0 1219	0 0709	0 0510
March-99	0 1247	0 0726	0 0521
April-99	0 1253	0 0722	0 0531
May-99	0 1223	0 0747	0 0476
June-99	0 1214	0 0774	0 0440
July-99	0 1226	0 0771	0 0455
August-99	0 1223	0 0791	0 0432
September-99	0 1229	0 0793	0 0436
October-99	0 1243	0 0806	0 0437
November-99	0 1259	0 0794	0 0465
December-99	0 1302	0 0814	0 0488
January-00	0 1325	0 0835	0 0490
February-00	0 1371	0 0825	0 0546
March-00	0 1356	0 0828	0 0528
April-00	0 1331	0 0829	0 0502
May-00	0 1301	0 0870	0 0431
June-00	0 1300	0 0836	0 0464
July-00	0 1325	0 0825	0 0500
August-00	0 1298	0 0813	0 0485
September-00	0 1268	0 0823	0 0445
October-00	0 1272	0 0814	0 0458
November-00	0 1246	0 0811	0 0435
December-00	0 1227	0 0784	0 0443
January-01	0 1251	0 0780	0 0471
February-01	0 1260	0 0774	0 0486
March-01	0 1273	0 0768	0 0505
April-01	0 1244	0 0794	0 0450
May-01	0 1311	0 0799	0 0512
June-01	0 1316	0 0785	0 0531
July-01	0 1341	0 0778	0 0563
August-01	0 1342	0 0759	0 0583
September-01	0 1247	0 0775	0 0472

**TENNESSEE-AMERICAN WATER COMPANY**  
**SCHEDULE C (continued)**  
**COMPARISON OF DCF EXPECTED RETURN**  
**ON AN EQUITY INVESTMENT IN NATURAL GAS DISTRIBUTION COMPANIES**  
**TO THE INTEREST RATE ON A-RATED UTILITY BONDS.**

Date	DCF	A-Bond Yield	Risk Premium
October-01	0 1258	0 0763	0 0495
November-01	0 1265	0 0757	0 0508
December-01	0 1247	0 0783	0 0464
January-02	0 1224	0 0766	0 0458
February-02	0 1230	0 0754	0 0476
March-02	0 1167	0 0776	0 0391
April-02	0 1132	0 0757	0 0375
May-02	0 1130	0 0752	0 0378
June-02	0 1138	0 0741	0 0397
July-02	0 1219	0 0731	0 0488
August-02	0.1207	0 0717	0 0490
September-02	0 1245	0 0708	0 0537
October-02	0 1228	0 0723	0 0505
November-02	0 1194	0 0714	0 0480
December-02	0 1190	0 0707	0 0483
January-03	0 1194	0 0706	0 0488
February-03	0 1211	0 0693	0 0518
March-03	0 1184	0 0679	0 0505
April-03	0 1157	0 0664	0 0493
May-03	0 1110	0 0636	0 0474
June-03	0 1101	0 0621	0 0480
July-03	0.1103	0 0657	0 0446
August-03	0 1112	0 0678	0 0434
September-03	0 1097	0 0656	0 0441
October-03	0 1094	0 0643	0 0451
November-03	0 1061	0 0637	0 0424
December-03	0 1040	0 0627	0 0413
January-04	0 1065	0 0615	0 0450
February-04	0 1033	0 0615	0 0418
March-04	0 1030	0 0597	0 0433
April-04	0 1033	0 0635	0 0398
May-04	0 1000	0 0662	0.0338
Average	0 1209	0 0738	0 0471

**TENNESSEE-AMERICAN WATER COMPANY**  
**SCHEDULE C (continued)**  
**COMPARISON OF DCF EXPECTED RETURN**  
**ON AN EQUITY INVESTMENT IN NATURAL GAS DISTRIBUTION COMPANIES**  
**TO THE INTEREST RATE ON A-RATED UTILITY BONDS.**

Notes A-rated utility bond yield information from the Mergent Bond Record DCF results are calculated using a quarterly DCF model as follows

- $D_0$  = Latest quarterly dividend per *Value Line*
- $P_0$  = Average of the monthly high and low stock prices for each month per S&P Stock Guide and Dow Jones
- FC = Flotation costs expressed as a percent of gross proceeds
- g = I/B/E/S forecast of future earnings growth for each month
- k = Cost of equity using the quarterly version of the DCF model shown by the formula below

$$k = \left[ \frac{d_0(1+g)^{\frac{1}{4}}}{P_0} \right]^4 - 1$$

**TENNESSEE-AMERICAN WATER COMPANY**  
**SCHEDULE D**  
**COMPARATIVE RETURNS ON S&P 500 STOCK INDEX**  
**AND MOODY'S A-RATED BONDS 1937 - 2004**

Year	Stock Price	Stock Dividend Yield	Stock Return	Bond Price	Bond Return
2004	1,132 52	0 0161		70 87	
2003	895 84	0 0180	28 22%	62 26	20 27%
2002	1,140 21	0 0138	-20 05%	57 44	15 35%
2001	1,335 63	0 0116	-13 47%	56 40	8 93%
2000	1,425 59	0 0118	-5 13%	52 60	14 82%
1999	1,248 77	0 0130	15 46%	63 03	-10 20%
1998	963 35	0 0162	31 25%	62 43	7 38%
1997	766 22	0 0195	27 68%	56 62	17 32%
1996	614 42	0 0231	27 02%	60 91	-0 48%
1995	465 25	0 0287	34 93%	50 22	29.26%
1994	472 99	0 0269	1 05%	60 01	-9 65%
1993	435 23	0 0288	11 56%	53 13	20 48%
1992	416 08	0 0290	7 50%	49 56	15 27%
1991	325 49	0 0382	31 65%	44 84	19 44%
1990	339 97	0 0341	-0 85%	45 60	7 11%
1989	285 41	0 0364	22 76%	43 06	15 18%
1988	250 48	0 0366	17 61%	40 10	17 36%
1987	264 51	0 0317	-2 13%	48 92	-9 84%
1986	208 19	0 0390	30 95%	39 98	32 36%
1985	171 61	0.0451	25 83%	32 57	35 05%
1984	166 39	0 0427	7 41%	31 49	16 12%
1983	144 27	0 0479	20 12%	29 41	20 65%
1982	117 28	0 0595	28 96%	24 48	36 48%
1981	132 97	0 0480	-7 00%	29 37	-3 01%
1980	110 87	0 0541	25 34%	34 69	-3 81%
1979	99 71	0 0533	16.52%	43 91	-11 89%
1978	90 25	0 0532	15 80%	49 09	-2 40%
1977	103.80	0 0399	-9 06%	50 95	4 20%
1976	96 86	0 0380	10 96%	43 91	25 13%
1975	72 56	0 0507	38 56%	41 76	14 75%
1974	96 11	0 0364	-20 86%	52 54	-12 91%
1973	118 40	0 0269	-16 14%	58 51	-3 37%
1972	103 30	0 0296	17 58%	56 47	10 69%
1971	93 49	0.0332	13 81%	53 93	12 13%
1970	90 31	0 0356	7 08%	50 46	14 81%
1969	102 00	0 0306	-8 40%	62 43	-12 76%
1968	95 04	0 0313	10 45%	66 97	-0 81%
1967	84 45	0 0351	16 05%	78 69	-9 81%
1966	93 32	0 0302	-6 48%	86 57	-4 48%
1965	86 12	0 0299	11.35%	91 40	-0 91%
1964	76 45	0 0305	15 70%	92 01	3 68%
1963	65 06	0 0331	20 82%	93 56	2 61%
1962	69 07	0 0297	-2 84%	89 60	8 89%
1961	59 72	0 0328	18 94%	89 74	4 29%
1960	58 03	0 0327	6 18%	84 36	11 13%

**TAWC ENERGY COMPANY  
SCHEDULE D (CONTINUED)  
COMPARATIVE RETURNS ON S&P 500 STOCK INDEX  
AND MOODY'S A-RATED BONDS 1937—2004**

Year	Stock Price	Stock Dividend Yield	Stock Return	Bond Price	Bond Return
1959	55 62	0 0324	7 57%	91 55	-3 49%
1958	41 12	0 0448	39 74%	101 22	-5 60%
1957	45 43	0 0431	-5 18%	100 70	4 49%
1956	44 15	0 0424	7 14%	113 00	-7 35%
1955	35 60	0 0438	28 40%	116 77	0 20%
1954	25 46	0 0569	45.52%	112 79	7 07%
1953	26 18	0 0545	2 70%	114 24	2 24%
1952	24 19	0 0582	14 05%	113 41	4 26%
1951	21 21	0 0634	20 39%	123 44	-4 89%
1950	16 88	0 0665	32 30%	125 08	1 89%
1949	15 36	0 0620	16 10%	119 82	7 72%
1948	14 83	0 0571	9 28%	118 50	4 49%
1947	15 21	0 0449	1 99%	126 02	-2 79%
1946	18 02	0 0356	-12 03%	126 74	2 59%
1945	13 49	0 0460	38 18%	119 82	9.11%
1944	11 85	0 0495	18 79%	119 82	3 34%
1943	10 09	0 0554	22.98%	118 50	4 49%
1942	8 93	0 0788	20.87%	117 63	4 14%
1941	10 55	0 0638	-8 98%	116 34	4 55%
1940	12 30	0 0458	-9 65%	112.39	7 08%
1939	12 50	0 0349	1 89%	105 75	10 05%
1938	11 31	0 0784	18 36%	99 83	9 94%
1937	17 59	0 0434	-31 36%	103 18	0 63%
Return			11 67%		6 40%
Risk					
Premium			5 27%		

Note See Appendix 3 for an explanation of how stock and bond returns are derived and the source of the data presented

**TENNESSEE-AMERICAN WATER COMPANY**  
**SCHEDULE E**  
**COMPARATIVE RETURNS ON S&P UTILITIES STOCK INDEX**  
**AND MOODY'S A-RATED BONDS 1937—2004**

Year	Stock Price	Stock Dividend Yield	Stock Return	Bond Price	Bond Return
2004	139.79			70.87	
2003	114.11	0.0508	27.58%	62.26	20.27%
2002	142.14	0.0454	-15.18	57.44	15.35
2002	243.79	0.0362		57.44	
2001	307.70	0.0287	-17.90%	56.40	8.92%
2000	239.17	0.0413	32.78%	52.60	14.82%
1999	253.52	0.0394	-1.72%	63.03	-10.20%
1998	228.61	0.0457	15.47%	62.43	7.38%
1997	201.14	0.0492	18.58%	56.62	17.32%
1996	202.57	0.0454	3.83%	60.91	-0.48%
1995	153.87	0.0584	37.49%	50.22	29.26%
1994	168.70	0.0496	-3.83%	60.01	-9.65%
1993	159.79	0.0537	10.95%	53.13	20.48%
1992	149.70	0.0572	12.46%	49.56	15.27%
1991	138.38	0.0607	14.25%	44.84	19.44%
1990	146.04	0.0558	0.33%	45.60	7.11%
1989	114.37	0.0699	34.68%	43.06	15.18%
1988	106.13	0.0704	14.80%	40.10	17.36%
1987	120.09	0.0588	-5.74%	48.92	-9.84%
1986	92.06	0.0742	37.87%	39.98	32.36%
1985	75.83	0.086	30.00%	32.57	35.05%
1984	68.50	0.0925	19.95%	31.49	16.12%
1983	61.89	0.0948	20.16%	29.41	20.65%
1982	51.81	0.1074	30.20%	24.48	36.48%
1981	52.01	0.0978	9.40%	29.37	-3.01%
1980	50.26	0.0953	13.01%	34.69	-3.81%
1979	50.33	0.0893	8.79%	43.91	-11.89%
1978	52.40	0.0791	3.96%	49.09	-2.40%
1977	54.01	0.0714	4.16%	50.95	4.20%
1976	46.99	0.0776	22.70%	43.91	25.13%
1975	38.19	0.092	32.24%	41.76	14.75%
1974	48.60	0.0713	-14.29%	52.54	-12.91%
1973	60.01	0.0556	-13.45%	58.51	-3.37%
1972	60.19	0.0542	5.12%	56.47	10.69%
1971	63.43	0.0504	-0.07%	53.93	12.13%
1970	55.72	0.0561	19.45%	50.46	14.81%
1969	68.65	0.0445	-14.38%	62.43	-12.76%
1968	68.02	0.0435	5.28%	66.97	-0.81%
1967	70.63	0.0392	0.22%	78.69	-9.81%
1966	74.50	0.0347	-1.72%	86.57	-4.48%
1965	75.87	0.0315	1.34%	91.40	-0.91%
1964	67.26	0.0331	16.11%	92.01	3.68%
1963	63.35	0.033	9.47%	93.56	2.61%
1962	62.69	0.032	4.25%	89.60	8.89%
1961	52.73	0.0358	22.47%	89.74	4.29%
1960	44.50	0.0403	22.52%	84.36	11.13%
1959	43.96	0.0377	5.00%	91.55	-3.49%

**TENNESSEE-AMERICAN WATER COMPANY  
SCHEDULE E (CONTINUED)  
COMPARATIVE RETURNS ON S&P UTILITIES STOCK INDEX  
AND MOODY'S A-RATED BONDS 1937—2004**

Year	Stock Price	Stock Dividend Yield	Stock Return	Bond Price	Bond Return
1958	33 30	0 0487	36 88%	101 22	-5 60%
1957	32 32	0 0487	7 90%	100 70	4 49%
1956	31 55	0 0472	7 16%	113 00	-7 35%
1955	29.89	0 0461	10 16%	116 77	0 20%
1954	25 51	0 052	22 37%	112 79	7 07%
1953	24 41	0 0511	9 62%	114 24	2 24%
1952	22 22	0 055	15 36%	113 41	4 26%
1951	20 01	0.0606	17 10%	123 44	-4 89%
1950	20 20	0 0554	4 60%	125 08	1 89%
1949	16 54	0 057	27 83%	119 82	7 72%
1948	16 53	0 0535	5 41%	118 50	4 49%
1947	19 21	0 0354	-10 41%	126 02	-2 79%
1946	21 34	0 0298	-7 00%	126 74	2 59%
1945	13 91	0 0448	57 89%	119 82	9 11%
1944	12 10	0 0569	20 65%	119 82	3 34%
1943	9 22	0 0621	37 45%	118 50	4 49%
1942	8 54	0 094	17 36%	117 63	4 14%
1941	13 25	0 0717	-28 38%	116 34	4 55%
1940	16 97	0 054	-16 52%	112 39	7 08%
1939	16 05	0 0553	11 26%	105 75	10 05%
1938	14 30	0 073	19 54%	99 83	9 94%
1937	24 34	0 0432	-36 93%	103 18	0 63%
Return			10 57%		6 40%
Risk Premium			4 16%		

Note See Appendix 3 for an explanation of how stock and bond returns are derived and the source of the data presented In 2002, S&P discontinued its S&P Utilities stock index, and S&P no longer reports dividend yields for electric utilities Thus, for this study, the utility stock returns beginning in 2002 are computed based on the companies contained in the S&P electric company index, as listed in the *S&P Security Price Record*. The dividend yields for these stocks are the stock dividend yields based on closing stock prices at January 31

**TENNESSEE-AMERICAN WATER COMPANY  
SCHEDULE F**

**AVERAGE CAPITAL STRUCTURE OF PROXY WATER COMPANY GROUP**

Line No	Company Name	Short-Term Debt	Long-Term Debt	Preferred Equity	Market Cap \$ (Mil)	Total Capital	Short-Term Debt %	Long-Term Debt %	Preferred %	Equity %
1	Amer States Water	56.8	229.8	0.0	362.0	648.6	8.76%	35.43%	0.00%	55.81%
2	Aqua America	135.8	696.7	0.0	1,904.3	2,736.8	4.96%	25.46%	0.00%	69.58%
3	California Water	7.4	250.4	3.5	478.3	739.6	1.00%	33.86%	0.47%	64.67%
4	Southwest Water	2.7	73.1	0.5	198.7	275.0	0.98%	26.59%	0.18%	72.25%
5	York Water Company	9.9	29.9	0.0	128.8	168.6	5.87%	17.74%	0.00%	76.39%
6	Composite	212.6	1,279.9	4.0	3,072.0	4,568.5	4.65%	28.02%	0.09%	67.24%

**AVERAGE CAPITAL STRUCTURE OF PROXY LDC GROUP**

Line No	Company Name	Short-Term Debt	Long-Term Debt	Preferred Equity	Market Cap \$ (Mil)	Total Capital	Short-Term Debt %	Long-Term Debt %	Preferred %	Equity %
1	AGL Resources	383.4	956.1	0.0	1,850.6	3,190.1	12.02%	29.97%	0.00%	58.01%
2	Atmos Energy	127.9	863.9	0.0	1,297.5	2,289.3	5.59%	37.74%	0.00%	56.68%
3	Equitable Resources	146.3	572.0	0.0	2,923.0	3,641.3	4.02%	15.71%	0.00%	80.27%
4	KeySpan Corp	927.1	5,224.1	83.8	5,799.3	12,034.3	7.70%	43.41%	0.70%	48.19%
5	NICOR Inc	415.0	396.2	4.3	1,508.2	2,323.7	17.86%	17.05%	0.19%	64.91%
6	Northwest Nat Gas	89.8	445.9	8.3	755.6	1,299.6	6.91%	34.31%	0.64%	58.14%
7	Peoples Energy	207.9	744.3	0.0	1,537.1	2,489.3	8.35%	29.90%	0.00%	61.75%
8	Piedmont Natural Gas	557.1	460.0	0.0	1,538.8	2,555.9	21.80%	18.00%	0.00%	60.21%
9	WGL Holdings Inc	178.9	636.7	28.2	1,389.7	2,233.5	8.01%	28.51%	1.26%	62.22%
10	Composite	3,033.4	10,299.2	124.6	18,599.8	32,057.0	9.46%	32.13%	0.39%	58.02%

Source of data    The Value Line Investment Survey May 2004



## THE QUARTERLY DCF MODEL

The simple DCF Model assumes that a firm pays dividends only at the end of each year. Since firms in fact pay dividends quarterly and investors appreciate the time value of money, the annual version of the DCF Model generally underestimates the value investors are willing to place on the firm's expected future dividend stream. In this appendix, we review two alternative formulations of the DCF Model that allow for the quarterly payment of dividends.

When dividends are assumed to be paid annually, the DCF Model suggests that the current price of the firm's stock is given by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_n + P_n}{(1+k)^n} \quad (1)$$

where

$P_0$	=	current price per share of the firm's stock,
$D_1, D_2, \dots, D_n$	=	expected annual dividends per share on the firm's stock,
$P_n$	=	price per share of stock at the time investors expect to sell the stock, and
$k$	=	return investors expect to earn on alternative investments of the same risk, i.e., the investors' required rate of return.

Unfortunately, expression (1) is rather difficult to analyze, especially for the purpose of estimating  $k$ . Thus, most analysts make a number of simplifying assumptions.

First, they assume that dividends are expected to grow at the constant rate  $g$  into the indefinite future. Second, they assume that the stock price at time  $n$  is simply the present value of all dividends expected in periods subsequent to  $n$ . Third, they assume that the investors' required rate of return,  $k$ , exceeds the expected dividend growth rate  $g$ . Under the above simplifying assumptions, a firm's stock price may be written as the following sum:

$$P_0 = \frac{D_0(1+g)}{(1+k)} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \dots, \quad (2)$$

where the three dots indicate that the sum continues indefinitely.

As we shall demonstrate shortly, this sum may be simplified to:

$$P_0 = \frac{D_0(1+g)}{(k-g)}.$$

First, however, we need to review the very useful concept of a geometric progression

### Geometric Progression

Consider the sequence of numbers 3, 6, 12, 24,..., where each number after the first is obtained by multiplying the preceding number by the factor 2. Obviously, this sequence of numbers may also be expressed as the sequence  $3, 3 \times 2, 3 \times 2^2, 3 \times 2^3$ , etc. This sequence is an example of a geometric progression.

Definition: A geometric progression is a sequence in which each term after the first is obtained by multiplying some fixed number, called the common ratio, by the preceding term.

A general notation for geometric progressions is:  $a$ , the first term,  $r$ , the common ratio, and  $n$ , the number of terms. Using this notation, any geometric progression may be represented by the sequence:

$$a, ar, ar^2, ar^3, \dots, ar^{n-1}.$$

In studying the DCF Model, we will find it useful to have an expression for the sum of  $n$  terms of a geometric progression. Call this sum  $S_n$ . Then

$$S_n = a + ar + \dots + ar^{n-1}. \quad (3)$$

However, this expression can be simplified by multiplying both sides of equation (3) by  $r$  and then subtracting the new equation from the old. Thus,

$$rS_n = ar + ar^2 + ar^3 + \dots + ar^n$$

and

$$S_n - rS_n = a - ar^n,$$

or

$$(1 - r) S_n = a (1 - r^n).$$

Solving for  $S_n$ , we obtain:

$$S_n = \frac{a(1 - r^n)}{(1 - r)} \quad (4)$$

as a simple expression for the sum of  $n$  terms of a geometric progression. Furthermore, if  $|r| < 1$ , then  $S_n$  is finite, and as  $n$  approaches infinity,  $S_n$  approaches  $a / (1 - r)$ . Thus, for a geometric progression with an infinite number of terms and  $|r| < 1$ , equation (4) becomes:

$$S = \frac{a}{1 - r} \quad (5)$$

#### Application to DCF Model

Comparing equation (2) with equation (3), we see that the firm's stock price (under the DCF assumption) is the sum of an infinite geometric progression with the first term

$$a = \frac{D_0(1 + g)}{(1 + k)}$$

and common factor

$$r = \frac{(1+g)}{(1+k)}$$

Applying equation (5) for the sum of such a geometric progression, we obtain

$$S = a \cdot \frac{1}{(1-r)} = \frac{D_0(1+g)}{(1+k)} \cdot \frac{1}{1 - \frac{1+g}{1+k}} = \frac{D_0(1+g)}{(1+k)} \cdot \frac{1+k}{k-g} = \frac{D_0(1+g)}{k-g}$$

as we suggested earlier.

### Quarterly DCF Model

The Annual DCF Model assumes that dividends grow at an annual rate of  $g\%$  per year (see Figure 1).

Figure 1

#### Annual DCF Model

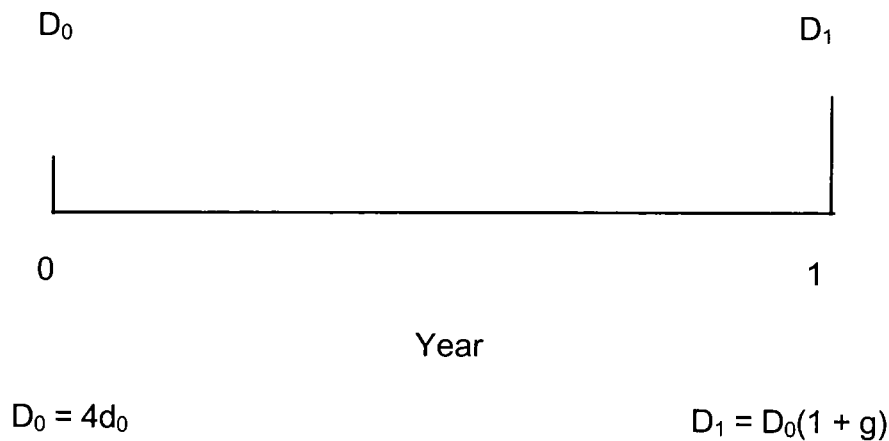
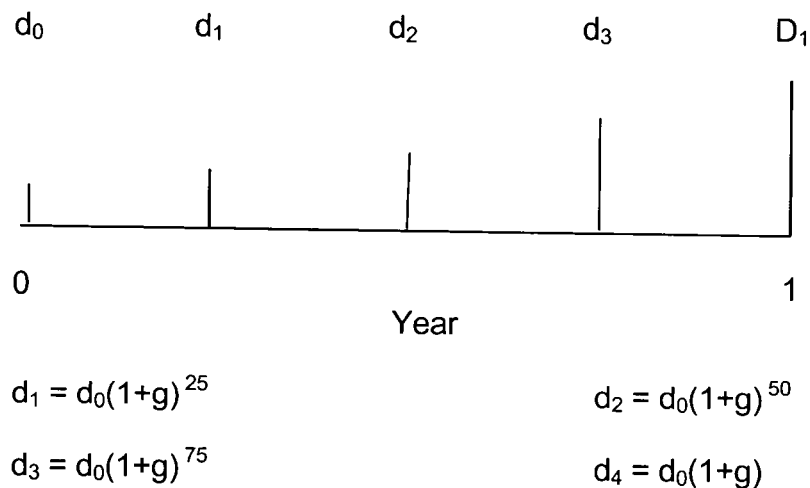


Figure 2

#### Quarterly DCF Model (Constant Growth Version)



In the Quarterly DCF Model, it is natural to assume that quarterly dividend payments differ from the preceding quarterly dividend by the factor  $(1 + g)^{25}$ , where  $g$  is

expressed in terms of percent per year and the decimal .25 indicates that the growth has only occurred for one quarter of the year. (See Figure 2.) Using this assumption, along with the assumption of constant growth and  $k > g$ , we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}}} + \frac{d_0(1+g)^{\frac{2}{4}}}{(1+k)^{\frac{2}{4}}} + \frac{d_0(1+g)^{\frac{3}{4}}}{(1+k)^{\frac{3}{4}}} + \dots \quad (6)$$

where  $d_0$  is the last quarterly dividend payment, rather than the last annual dividend payment. (We use a lower case d to remind the reader that this is not the annual dividend.)

Although equation (6) looks formidable at first glance, it too can be greatly simplified using the formula [equation (4)] for the sum of an infinite geometric progression. As the reader can easily verify, equation (6) can be simplified to:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}} - (1+g)^{\frac{1}{4}}} \quad (7)$$

Solving equation (7) for  $k$ , we obtain a DCF formula for estimating the cost of equity under the quarterly dividend assumption:

$$k = \left[ \frac{d_0(1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1 \quad (8)$$

### An Alternative Quarterly DCF Model

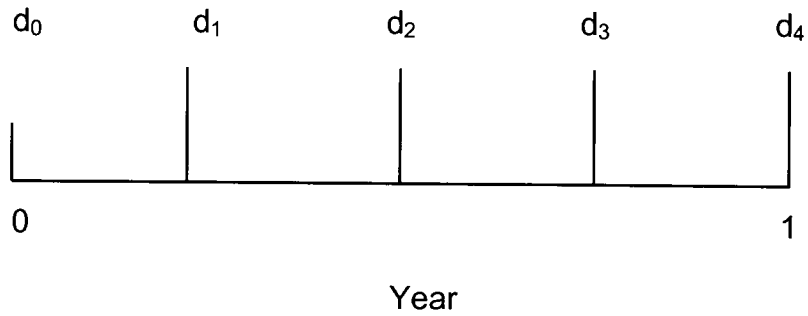
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly DCF Model that allows for constant quarterly dividend payments within each dividend year

Assume then that the firm pays dividends quarterly and that each dividend payment is constant for four consecutive quarters. There are four cases to consider, with each case distinguished by varying assumptions about where we are evaluating the firm in relation to the time of its next dividend increase. (See Figure 3.)

**Figure 3**

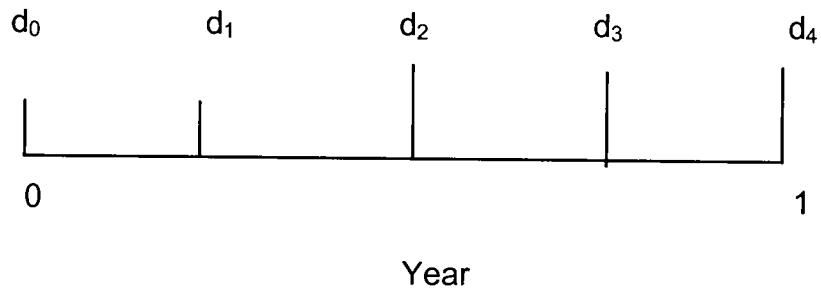
**Quarterly DCF Model (Constant Dividend Version)**

**Case 1**



$$d_1 = d_2 = d_3 = d_4 = d_0(1+g)$$

**Case 2**



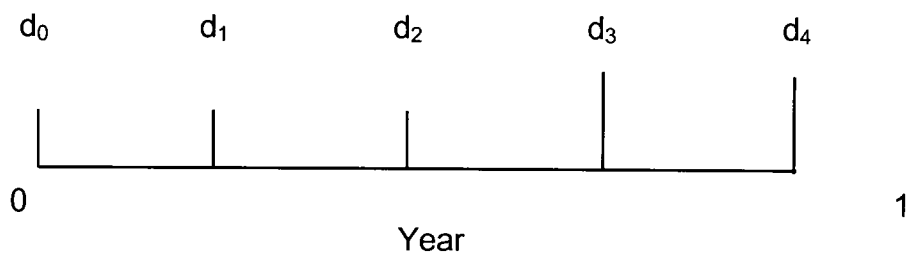
$$d_1 = d_0$$

$$d_2 = d_3 = d_4 = d_0(1+g)$$



**Figure 3 (continued)**

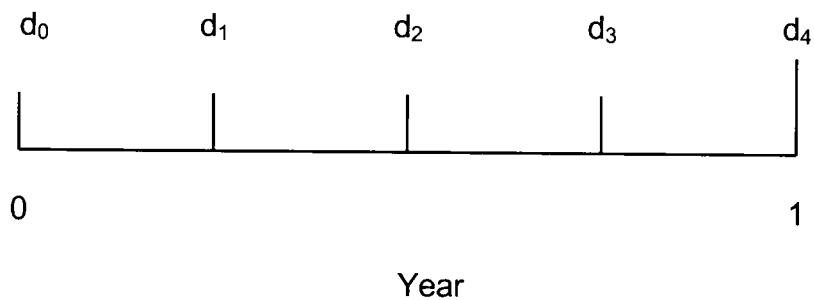
**Case 3**



$$d_1 = d_2 = d_0$$

$$d_3 = d_4 = d_0(1+g)$$

**Case 4**



$$d_1 = d_2 = d_3 = d_0$$

$$d_4 = d_0(1+g)$$

If we assume that the investor invests the quarterly dividend in an alternative investment of the same risk, then the amount accumulated by the end of the year will in all cases be given by

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4$$

where  $d_1$ ,  $d_2$ ,  $d_3$  and  $d_4$  are the four quarterly dividends. Under these new assumptions, the firm's stock price may be expressed by an Annual DCF Model of the form (2), with the exception that

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4 \quad (9)$$

is used in place of  $D_0(1+g)$ . But, we already know that the Annual DCF Model may be reduced to

$$P_0 = \frac{D_0(1+g)}{k-g}$$

Thus, under the assumptions of the second Quarterly DCF Model, the firm's cost of equity is given by

$$k = \frac{D_1^*}{P_0} + g \quad (10)$$

with  $D_1^*$  given by (9).

Although equation (10) looks like the Annual DCF Model, there are at least two very important practical differences. First, since  $D_1^*$  is always greater than  $D_0(1+g)$ , the estimates of the cost of equity are always larger (and more accurate) in the Quarterly Model (10) than in the Annual Model. Second, since  $D_1^*$  depends on  $k$  through equation (9), the unknown “ $k$ ” appears on both sides of (10), and an iterative procedure is required to solve for  $k$ .

## ADJUSTING FOR FLOTATION COSTS IN DETERMINING A PUBLIC UTILITY'S ALLOWED RATE OF RETURN ON EQUITY

### I. INTRODUCTION

Regulation of public utilities is guided by the principle that utility revenues should be sufficient to allow recovery of all prudently incurred expenses, including the cost of capital. As set forth in the 1944 *Hope Natural Gas Case* [*Federal Power Comm'n v. Hope Natural Gas Co.* 320 U. S. 591 (1944) at 603], the U. S. Supreme Court states:

From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock ... By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.

Since the flotation costs arising from the issuance of debt and equity securities are an integral component of capital costs, this standard requires that the company's revenues be sufficient to fully recover flotation costs.

Despite the widespread agreement that flotation costs should be recovered in the regulatory process, several issues still need to be resolved. These include:

1. How is the term "flotation costs" defined? Does it include only the out-of-pocket costs associated with issuing securities (e. g., legal fees, printing costs, selling and underwriting expenses), or does it also include the reduction in a security's price that frequently accompanies flotation (i. e., market pressure)?
2. What should be the time pattern of cost recovery? Should a company be allowed to recover flotation costs immediately, or should flotation costs be recovered over the life of the issue?
3. For the purposes of regulatory accounting, should flotation costs be included as an expense? As an addition to rate base? Or as an additional element of a firm's allowed rate of return?
4. Do existing regulatory methods for flotation cost recovery allow a firm **full** recovery of flotation costs?

In this paper, I review the literature pertaining to the above issues and discuss my own views regarding how this literature applies to the cost of equity for a regulated firm.

### II. DEFINITION OF FLOTATION COST

The value of a firm is related to the future stream of net cash flows (revenues minus expenses measured on a cash basis) that can be derived from its assets. In the

process of acquiring assets, a firm incurs certain expenses which reduce its value. Some of these expenses or costs are directly associated with revenue production in one period (e. g , wages, cost of goods sold), others are more properly associated with revenue production in many periods (e. g., the acquisition cost of plant and equipment). In either case, the word "cost" refers to any item that reduces the value of a firm

If this concept is applied to the act of issuing new securities to finance asset purchases, many items are properly included in issuance or flotation costs. These include: (1) compensation received by investment bankers for underwriting services, (2) legal fees, (3) accounting fees, (4) engineering fees, (5) trustee's fees, (6) listing fees, (7) printing and engraving expenses, (8) SEC registration fees, (9) Federal Revenue Stamps, (10) state taxes, (11) warrants granted to underwriters as extra compensation, (12) postage expenses, (13) employees' time, (14) market pressure, and (15) the offer discount. The finance literature generally divides these flotation cost items into three categories, namely, underwriting expenses, issuer expenses, and price effects.

### III. MAGNITUDE OF FLOTATION COSTS

The finance literature contains several studies of the magnitude of the flotation costs associated with new debt and equity issues. These studies differ primarily with regard to the time period studied, the sample of companies included, and the source of data. The flotation cost studies generally agree, however, that for large issues, underwriting expenses represent approximately one and one-half percent of the proceeds of debt issues and three to five percent of the proceeds of seasoned equity issues. They also agree that issuer expenses represent approximately 0.5 percent of both debt and equity issues, and that the announcement of an equity issue reduces the company's stock price by at least two to three percent of the proceeds from the stock issue. Thus, total flotation costs represent approximately two percent<sup>4</sup> of the proceeds from debt issues, and five and one-half to eight and one-half percent of the proceeds of equity issues.

Lee *et. al.* [14] is an excellent example of the type of flotation cost studies found in the finance literature. The Lee study is a comprehensive recent study of the underwriting and issuer costs associated with debt and equity issues for both utilities and non-utilities. The results of the Lee *et. al.* study are reproduced in Tables 1 and 2. Table 1 demonstrates that the total underwriting and issuer expenses for the 1,092 debt issues in their study averaged 2.24 percent of the proceeds of the issues, while the total underwriting and issuer costs for the 1,593 seasoned equity issues in their study averaged 7.11 percent of the proceeds of the new issue. Table 1 also demonstrates that the total underwriting and issuer costs of seasoned equity

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<sup>4</sup> The two percent flotation cost on debt only recognizes the cost of newly-issued debt. When interest rates decline, many companies exercise the call provisions on higher cost debt and reissue debt at lower rates. This process involves reacquisition costs that are not included in the academic studies. If reacquisition costs were included in the academic studies, debt flotation costs could increase significantly.

offerings, as a percent of proceeds, decline with the size of the issue. For issues above \$60 million, total underwriting and issuer costs amount to from three to five percent of the amount of the proceeds.

Table 2 reports the total underwriting and issuer expenses for 135 utility debt issues and 136 seasoned utility equity issues. Total underwriting and issuer expenses for utility bond offerings averaged 1.47 percent of the amount of the proceeds and for seasoned utility equity offerings averaged 4.92 percent of the amount of the proceeds. Again, there are some economies of scale associated with larger equity offerings. Total underwriting and issuer expenses for equity offerings in excess of 40 million dollars generally range from three to four percent of the proceeds.

The results of the Lee study for large equity issues are consistent with results of earlier studies by Bhagat and Frost [4], Mikkelsen and Partch [17], and Smith [24]. Bhagat and Frost found that total underwriting and issuer expenses average approximately four and one-half percent of the amount of proceeds from negotiated utility offerings during the period 1973 to 1980, and approximately three and one-half percent of the amount of the proceeds from competitive utility offerings over the same period. Mikkelsen and Partch found that total underwriting and issuer expenses average five and one-half percent of the proceeds from seasoned equity offerings over the 1972 to 1982 period. Smith found that total underwriting and issuer expenses for larger equity issues generally amount to four to five percent of the proceeds of the new issue.

The finance literature also contains numerous studies of the decline in price associated with sales of large blocks of stock to the public. These articles relate to the price impact of (1) initial public offerings; (2) the sale of large blocks of stock from one investor to another; and (3) the issuance of seasoned equity issues to the general public. All of these studies generally support the notion that the announcement of the sale of large blocks of stock produces a decline in a company's share price. The decline in share price for initial public offerings is significantly larger than the decline in share price for seasoned equity offerings, and the decline in share price for public utilities is less than the decline in share price for non-public utilities. A comprehensive study of the magnitude of the decline in share price associated specifically with the sale of new equity by public utilities is reported in Pettway [19], who found the market pressure effect for a sample of 368 public utility equity sales to be in the range of two to three percent. This decline in price is a real cost to the utility, because the proceeds to the utility depend on the stock price on the day of issue.

In addition to the price decline associated with the announcement of a new equity issue, the finance literature recognizes that there is also a price decline associated with the actual issuance of equity securities. In particular, underwriters typically sell seasoned new equity securities to investors at a price lower than the closing market price on the day preceding the issue. The Rules of Fair Practice of the National Association of Securities Dealers require that underwriters not sell shares at a price above the offer price. Since the offer price represents a binding constraint to the underwriter, the underwriter tends to set the offer price slightly below the market

price on the day of issue to compensate for the risk that the price received by the underwriter may go down, but can not increase. Smith provides evidence that the offer discount tends to be between 0.5 and 0.8 percent of the proceeds of an equity issue. I am not aware of any similar studies for debt issues.

In summary, the finance literature provides strong support for the conclusion that total underwriting and issuer expenses for public utility debt offerings represent approximately two percent of the amount of the proceeds, while total underwriting and issuer expenses for public utility equity offerings represent at least four to five percent of the amount of the proceeds. In addition, the finance literature supports the conclusion that the cost associated with the decline in stock price at the announcement date represents approximately two to three percent as a result of a large public utility equity issue.

#### **IV. TIME PATTERN OF FLOTATION COST RECOVERY**

Although flotation costs are incurred only at the time a firm issues new securities, there is no reason why an issuing firm ought to recognize the expense only in the current period. In fact, if assets purchased with the proceeds of a security issue produce revenues over many years, a sound argument can be made in favor of recognizing flotation expenses over a reasonably lengthy period of time. Such recognition is certainly consistent with the generally accepted accounting principle that the time pattern of expenses match the time pattern of revenues, and it is also consistent with the normal treatment of debt flotation expenses in both regulated and unregulated industries.

In the context of a regulated firm, it should be noted that there are many possible time patterns for the recovery of flotation expenses. However, if it is felt that flotation expenses are most appropriately recovered over a period of years, then it should be recognized that investors must also be compensated for the passage of time. That is to say, the value of an investor's capital will be reduced if the expenses are merely distributed over time, without any allowance for the time value of money.

#### **V. ACCOUNTING FOR FLOTATION COST IN A REGULATORY SETTING**

In a regulatory setting, a firm's revenue requirements are determined by the equation:

$$\text{Revenue Requirement} = \text{Total Expenses} + \text{Allowed Rate of Return} \times \text{Rate Base}$$

Thus, there are three ways in which an issuing firm can account for and recover its flotation expenses: (1) treat flotation expenses as a current expense and recover them immediately; (2) include flotation expenses in rate base and recover them over time; and (3) adjust the allowed rate of return upward and again recover flotation expenses over time. Before considering methods currently being used to recover flotation expenses in a regulatory setting, I shall briefly consider the advantages and disadvantages of these three basic recovery methods.

**Expenses.** Treating flotation costs as a current expense has several advantages. Because it allows for recovery at the time the expense occurs, it is not necessary to compute amortized balances over time and to debate which interest rate should be applied to these balances. A firm's stockholders are treated fairly, and so are the firm's customers, because they pay neither more nor less than the actual flotation expense. Since flotation costs are relatively small compared to the total revenue requirement, treatment as a current expense does not cause unusual rate hikes in the year of flotation, as would the introduction of a large generating plant in a state that does not allow Construction Work in Progress in rate base.

On the other hand, there are two major disadvantages of treating flotation costs as a current expense. First, since the asset purchased with the acquired funds will likely generate revenues for many years into the future, it seems unfair that current ratepayers should bear the full cost of issuing new securities, when future ratepayers share in the benefits. Second, this method requires an estimate of the underpricing effect on each security issue. Given the difficulties involved in measuring the extent of underpricing, it may be more accurate to estimate the average underpricing allowance for many securities than to estimate the exact figure for one security.

**Rate Base.** In an article in *Public Utilities Fortnightly*, Bierman and Hass [5] recommend that flotation costs be treated as an intangible asset that is included in a firm's rate base along with the assets acquired with the stock proceeds. This approach has many advantages. For ratepayers, it provides a better match between benefits and expenses: the future ratepayers who benefit from the financing costs contribute the revenues to recover these costs. For investors, if the allowed rate of return is equal to the investors' required rate of return, it is also theoretically fair since they are compensated for the opportunity cost of their investment (including both the time value of money and the investment risk).

Despite the compelling advantages of this method of cost recovery, there are several disadvantages that probably explain why it has not been used in practice. First, a firm will only recover the proper amount for flotation expenses if the rate base is multiplied by the appropriate cost of capital. To the extent that a commission under or over estimates the cost of capital, a firm will under or over recover its flotation expenses. Second, it may be both legally and psychologically difficult for commissioners to include an intangible asset in a firm's rate base. According to established legal doctrine, assets are to be included in rate base only if they are "used and useful" in the public service. It is unclear whether intangible assets such as flotation expenses meet this criterion.

**Rate of Return** The prevailing practice among state regulators is to treat flotation expenses as an additional element of a firm's cost of capital or allowed rate of return. This method is similar to the second method above (treatment in rate base) in that some part of the initial flotation cost is amortized over time. However, it has a disadvantage not shared by the rate base method. If flotation cost is included in rate base, it is fairly easy to keep track of the flotation cost on each new equity issue and see how it is recovered over time. Using the rate of return method, it is not possible to track the flotation cost for specific issues because the flotation cost for a specific

issue is never recorded. Thus, it is not clear to participants whether a current allowance is meant to recover (1) flotation costs actually incurred in a test period, (2) expected future flotation costs, or (3) past flotation costs. This confusion never arises in the treatment of debt flotation costs. Because the exact costs are recorded and explicitly amortized over time, participants recognize that current allowances for debt flotation costs are meant to recover some fraction of the flotation costs on all past debt issues.

## VI. EXISTING REGULATORY METHODS

Although most state commissions prefer to let a regulated firm recover flotation expenses through an adjustment to the allowed rate of return, there is considerable controversy about the magnitude of the required adjustment. The following are some of the most frequently asked questions: (1) Should an adjustment to the allowed return be made every year, or should the adjustment be made only in those years in which new equity is raised? (2) Should an adjusted rate of return be applied to the entire rate base, or should it be applied only to that portion of the rate base financed with paid-in capital (as opposed to retained earnings)? (3) What is the appropriate formula for adjusting the rate of return?

This section reviews several methods of allowing for flotation cost recovery. Since the regulatory methods of allowing for recovery of debt flotation costs is well known and widely accepted, I will begin my discussion of flotation cost recovery procedures by describing the widely accepted procedure of allowing for debt flotation cost recovery.

### Debt Flotation Costs

Regulators uniformly recognize that companies incur flotation costs when they issue debt securities. They typically allow recovery of debt flotation costs by making an adjustment to both the cost of debt and the rate base (see Brigham [6]). Assume that: (1) a regulated company issues \$100 million in bonds that mature in 10 years, (2) the interest rate on these bonds is seven percent; and (3) flotation costs represent four percent of the amount of the proceeds. Then the cost of debt for regulatory purposes will generally be calculated as follows:

$$\begin{aligned}\text{Cost of Debt} &= \frac{\text{Interest expense} + \text{Amortization of flotation costs}}{\text{Principal value} - \text{Unamortized flotation costs}} \\ &= \frac{\$7,000,000 + \$400,000}{\$100,000,000 - \$4,000,000} \\ &= 7.71\%\end{aligned}$$

Thus, current regulatory practice requires that the cost of debt be adjusted upward by approximately 71 basis points, in this example, to allow for the recovery of debt flotation costs. This example does not include losses on reacquisition of debt. The



flotation cost allowance would increase if losses on reacquisition of debt were included.

The logic behind the traditional method of allowing for recovery of debt flotation costs is simple. Although the company has issued \$100 million in bonds, it can only invest \$96 million in rate base because flotation costs have reduced the amount of funds received by \$4 million. If the company is not allowed to earn a 71 basis point higher rate of return on the \$96 million invested in rate base, it will not generate sufficient cash flow to pay the seven percent interest on the \$100 million in bonds it has issued. Thus, proper regulatory treatment is to increase the required rate of return on debt by 71 basis points.

### Equity Flotation Costs

The finance literature discusses several methods of recovering equity flotation costs. Since each method stems from a specific model, (i. e., set of assumptions) of a firm and its cash flows, I will highlight the assumptions that distinguish one method from another.

**Arzac and Marcus.** Arzac and Marcus [2] study the proper flotation cost adjustment formula for a firm that makes continuous use of retained earnings and external equity financing and maintains a constant capital structure (debt/equity ratio). They assume at the outset that underwriting expenses and underpricing apply only to new equity obtained from external sources. They also assume that a firm has previously recovered all underwriting expenses, issuer expenses, and underpricing associated with previous issues of new equity.

To discuss and compare various equity flotation cost adjustment formulas, Arzac and Marcus make use of the following notation

k	=	an investors' required return on equity
r	=	a utility's allowed return on equity base
S	=	value of equity in the absence of flotation costs
S <sub>f</sub>	=	value of equity net of flotation costs
K <sub>t</sub>	=	equity base at time t
E <sub>t</sub>	=	total earnings in year t
D <sub>t</sub>	=	total cash dividends at time t
b	=	$(E_t - D_t) / E_t$ = retention rate, expressed as a fraction of earnings
h	=	new equity issues, expressed as a fraction of earnings
m	=	equity investment rate, expressed as a fraction of earnings, $m = b + h < 1$
f	=	flotation costs, expressed as a fraction of the value of an issue.

Because of flotation costs, Arzac and Marcus assume that a firm must issue a greater amount of external equity each year than it actually needs. In terms of the above notation, a firm issues  $hE_t \div (1-f)$  to obtain  $hE_t$  in external equity funding. Thus, each year a firm loses.

### Equation 3

$$L = \frac{hE_t}{1-f} - hE_t = \frac{f}{1-f} \times hE_t$$

due to flotation expenses. The present value,  $V$ , of all future flotation expenses is:

### Equation 4

$$V = \sum_{t=1}^{\infty} \frac{fhE_t}{(1-f)(1+k)^t} = \frac{fh}{1-f} \times \frac{rK_0}{k-mr}$$

To avoid diluting the value of the initial stockholder's equity, a regulatory authority needs to find the value of  $r$ , a firm's allowed return on equity base, that equates the value of equity net of flotation costs to the initial equity base ( $S_f = K_0$ ). Since the value of equity net of flotation costs equals the value of equity in the absence of flotation costs minus the present value of flotation costs, a regulatory authority needs to find that value of  $r$  that solves the following equation:

$$S_f = S - L.$$

This value is:

### Equation 5

$$r = \frac{k}{1 - \frac{fh}{1-f}}$$

To illustrate the Arzac-Marcus approach to adjusting the allowed return on equity for the effect of flotation costs, suppose that the cost of equity in the absence of flotation costs is 12 percent. Furthermore, assume that a firm obtains external equity financing each year equal to 10 percent of its earnings and that flotation expenses equal 5 percent of the value of each issue. Then, according to Arzac and Marcus, the allowed return on equity should be:

$$r = \frac{.12}{1 - \frac{(.05)(.1)}{.95}} = .1206 = 12.06\%$$

**Summary** With respect to the three questions raised at the beginning of this section, it is evident that Arzac and Marcus believe the flotation cost adjustment should be applied each year, since continuous external equity financing is a

fundamental assumption of their model. They also believe that the adjusted rate of return should be applied to the entire equity-financed portion of the rate base because their model is based on the assumption that the flotation cost adjustment mechanism will be applied to the entire equity financed portion of the rate base. Finally, Arzac and Marcus recommend a flotation cost adjustment formula, Equation (3), that implicitly excludes recovery of financing costs associated with financing in previous periods and includes only an allowance for the fraction of equity financing obtained from external sources.

**Patterson.** The Arzac-Marcus flotation cost adjustment formula is significantly different from the conventional approach (found in many introductory textbooks) which recommends the adjustment equation:

#### Equation 6

$$r = \frac{D_t}{P_{t-1}(1-f)} + g$$

where  $P_{t-1}$  is the stock price in the previous period and  $g$  is the expected dividend growth rate. Patterson [18] compares the Arzac-Marcus adjustment formula to the conventional approach and reaches the conclusion that the Arzac-Marcus formula effectively expenses issuance costs as they are incurred, while the conventional approach effectively amortizes them over an assumed infinite life of the equity issue. Thus, the conventional formula is similar to the formula for the recovery of debt flotation costs: it is not meant to compensate investors for the flotation costs of future issues, but instead is meant to compensate investors for the flotation costs of previous issues. Patterson argues that the conventional approach is more appropriate for rate making purposes because the plant purchased with external equity funds will yield benefits over many future periods.

**Illustration.** To illustrate the Patterson approach to flotation cost recovery, assume that a newly organized utility sells an initial issue of stock for \$100 per share, and that the utility plans to finance all new investments with retained earnings. Assume also that: (1) the initial dividend per share is six dollars; (2) the expected long-run dividend growth rate is six percent; (3) the flotation cost is five percent of the amount of the proceeds, and (4) the payout ratio is 51.28 percent. Then, the investor's required rate of return on equity is  $[k = (D/P) + g = 6 \text{ percent} + 6 \text{ percent} = 12 \text{ percent}]$ ; and the flotation-cost-adjusted cost of equity is  $[6 \text{ percent} (1/.95) + 6 \text{ percent} = 12.316 \text{ percent}]$ .

The effects of the Patterson adjustment formula on the utility's rate base, dividends, earnings, and stock price are shown in Table 3. We see that the Patterson formula allows earnings and dividends to grow at the expected six percent rate. We also see that the present value of expected future dividends, \$100, is just sufficient to induce investors to part with their money. If the present value of expected future dividends were less than \$100, investors would not have been willing to invest \$100 in the firm. Furthermore, the present value of future dividends will only equal \$100 if the firm is

allowed to earn the 12.316 percent flotation-cost-adjusted cost of equity on its entire rate base.

**Summary.** Patterson's opinions on the three issues raised in this section are in stark contrast to those of Arzac and Marcus. He believes that: (1) a flotation cost adjustment should be applied in every year, regardless of whether a firm issues any new equity in each year; (2) a flotation cost adjustment should be applied to the entire equity-financed portion of the rate base, including that portion financed by retained earnings; and (3) the rate of return adjustment formula should allow a firm to recover an appropriate fraction of all previous flotation expenses.

## VII. CONCLUSION

Having reviewed the literature and analyzed flotation cost issues, I conclude that

**Definition of Flotation Cost:** A regulated firm should be allowed to recover both the total underwriting and issuance expenses associated with issuing securities and the cost of market pressure.

**Time Pattern of Flotation Cost Recovery.** Shareholders are indifferent between the alternatives of immediate recovery of flotation costs and recovery over time, as long as they are fairly compensated for the opportunity cost of their money. This opportunity cost must include both the time value of money and a risk premium for equity investments of this nature.

**Regulatory Recovery of Flotation Costs.** The Patterson approach to recovering flotation costs is the only rate-of-return-adjustment approach that meets the *Hope* case criterion that a regulated company's revenues must be sufficient to allow the company an opportunity to recover all prudently incurred expenses, including the cost of capital. The Patterson approach is also the only rate-of-return-adjustment approach that provides an incentive for investors to invest in the regulated company.

**Implementation of a Flotation Cost Adjustment.** As noted earlier, prevailing regulatory practice seems to be to allow the recovery of flotation costs through an adjustment to the required rate of return. My review of the literature on this subject indicates that there are at least two recommended methods of making this adjustment: the Patterson approach and the Arzac-Marcus approach. The Patterson approach assumes that a firm's flotation expenses on new equity issues are treated in the same manner as flotation expenses on new bond issues, i. e., they are amortized over future time periods. If this assumption is true (and I believe it is), then the flotation cost adjustment should be applied to a firm's entire equity base, including retained earnings. In practical terms, the Patterson approach produces an increase in a firm's cost of equity of approximately thirty basis points. The Arzac-Marcus approach assumes that flotation costs on new equity issues are recovered entirely in the year in which the securities are sold. Under the Arzac-Marcus assumption, a firm should not be allowed any adjustments for flotation costs associated with previous flotations. Instead, a firm should be allowed only an adjustment on future security sales as they occur. Under reasonable assumptions

about the rate of new equity sales, this method produces an increase in the cost of equity of approximately six basis points. Since the Arzac-Marcus approach does not allow the company to recover the entire amount of its flotation cost, I recommend that this approach be rejected and the Patterson approach be accepted.

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**Table 4**  
Direct Costs as a Percentage of Gross Proceeds  
for Equity (IPOs and SEOs) and Straight and Convertible Bonds  
Offered by Domestic Operating Companies 1990—1994<sup>5</sup>

**Equities**

Proceeds (\$ in millions)	IPOs				SEOs			
	No of Issue s	Gross Spread s	Other Direct Expense s	Total Direct Costs	No of Issue s	Gross Spread s	Other Direct Expense s	Total Direct Costs
2-9 99	337	9.05%	7.91%	16.96%	167	7.72%	5.56%	13.28%
10-19 99	389	7.24%	4.39%	11.63%	310	6.23%	2.49%	8.72%
20-39 99	533	7.01%	2.69%	9.70%	425	5.60%	1.33%	6.93%
40-59 99	215	6.96%	1.76%	8.72%	261	5.05%	0.82%	5.87%
60-79 99	79	6.74%	1.46%	8.20%	143	4.57%	0.61%	5.18%
80-99 99	51	6.47%	1.44%	7.91%	71	4.25%	0.48%	4.73%
100-199 99	106	6.03%	1.03%	7.06%	152	3.85%	0.37%	4.22%
200-499 99	47	5.67%	0.86%	6.53%	55	3.26%	0.21%	3.47%
500 and up	10	5.21%	0.51%	5.72%	9	3.03%	0.12%	3.15%
<b>Total/Average</b>	<b>1,767</b>	<b>7.31%</b>	<b>3.69%</b>	<b>11.00%</b>	<b>1,593</b>	<b>5.44%</b>	<b>1.67%</b>	<b>7.11%</b>

**Bonds**

Proceeds (\$ in millions)	Convertible Bonds				Straight Bonds			
	No of Issue s	Gross Spread s	Other Direct Expense s	Total Direct Costs	No of Issue s	Gross Spread s	Other Direct Expense s	Total Direct Costs
2-9 99	4	6.07%	2.68%	8.75%	32	2.07%	2.32%	4.39%
10-19 99	14	5.48%	3.18%	8.66%	78	1.36%	1.40%	2.76%
20-39 99	18	4.16%	1.95%	6.11%	89	1.54%	0.88%	2.42%
40-59 99	28	3.26%	1.04%	4.30%	90	0.72%	0.60%	1.32%
60-79 99	47	2.64%	0.59%	3.23%	92	1.76%	0.58%	2.34%
80-99 99	13	2.43%	0.61%	3.04%	112	1.55%	0.61%	2.16%
100-199 99	57	2.34%	0.42%	2.76%	409	1.77%	0.54%	2.31%
200-499 99	27	1.99%	0.19%	2.18%	170	1.79%	0.40%	2.19%
500 and up	3	2.00%	0.09%	2.09%	20	1.39%	0.25%	1.64%
<b>Total/Average</b>	<b>211</b>	<b>2.92%</b>	<b>0.87%</b>	<b>3.79%</b>	<b>1,092</b>	<b>1.62%</b>	<b>0.62%</b>	<b>2.24%</b>

**Notes**

Closed-end funds and unit offerings are excluded from the sample. Rights offerings for SEOs are also excluded. Bond offerings do not include securities backed by mortgages and issues by Federal agencies. Only firm commitment offerings and non-shelf-registered offerings are included.

Gross Spreads as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.

Other Direct Expenses as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.

Total Direct Costs as a percentage of total proceeds (total direct costs are the sum of gross spreads and other direct expenses).

<sup>5</sup> Inmoo Lee, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *Journal of Financial Research* Vol 19 No 1 (Spring 1996) pp 59—74



**Table 5**  
Direct Costs of Raising Capital 1990—1994  
Utility versus Non-Utility Companies<sup>6</sup>

<b>Equities</b>						
<b>Non-Utilities</b>	<b>IPOs</b>			<b>SEOs</b>		
Proceeds (\$ in millions)	No. of Issues	Gross Spreads	Total Direct Costs	No Of Issues	Gross Spreads	Total Direct Costs
2-9 99	332	9 04%	16 97%	154	7.91%	13 76%
10-19 99	388	7.24%	11 64%	278	6 42%	9 01%
20-39 99	528	7 01%	9 70%	399	5 70%	7 07%
40-59 99	214	6 96%	8 71%	240	5 17%	6 02%
60-79 99	78	6 74%	8 21%	131	4 68%	5 31%
80-99 99	47	6 46%	7 88%	60	4 35%	4 84%
100-199 99	101	6 01%	7 01%	137	3 97%	4 36%
200-499 99	44	5 65%	6 49%	50	3 27%	3 48%
500 and up	10	5 21%	5 72%	8	3 12%	3 25%
<b>Total/Average</b>	<b>1,742</b>	<b>7 31%</b>	<b>11 01%</b>	<b>1,457</b>	<b>5 57%</b>	<b>7 32%</b>
<b>Utilities Only</b>						
2-9 99	5	9 40%	16 54%	13	5 41%	7 68%
10-19 99	1	7 00%	8 77%	32	4 59%	6 21%
20-39 99	5	7 00%	9 86%	26	4 17%	4 96%
40-59 99	1	6 98%	11 55%	21	3 69%	4 12%
60-79 99	1	6 50%	7 55%	12	3 39%	3 72%
80-99 99	4	6 57%	8 24%	11	3.68%	4 11%
100-199 99	5	6 45%	7 96%	15	2 83%	2 98%
200-499 99	3	5.88%	7 00%	5	3 19%	3 48%
500 and up	0			1	2 25%	2 31%
<b>Total/Average</b>	<b>25</b>	<b>7.15%</b>	<b>10 14%</b>	<b>136</b>	<b>4 01%</b>	<b>4 92%</b>

<sup>6</sup> Lee et al, op cit

Table 2 (continued)  
Direct Costs of Raising Capital 1990—1994  
Utility versus Non-Utility Companies<sup>7</sup>

Bonds						
Non- Utilities	Convertible Bonds			Straight Bonds		
Proceeds (\$ in millions)	No of Issues	Gross Spreads	Total Direct Costs	No of Issues	Gross Spreads	Total Direct Costs
2-9 99	4	6 07%	8 75%	29	2 07%	4 53%
10-19 99	12	5 54%	8 65%	47	1 70%	3 28%
20-39 99	16	4 20%	6 23%	63	1 59%	2 52%
40-59 99	28	3 26%	4 30%	76	0 73%	1 37%
60-79 99	47	2 64%	3 23%	84	1 84%	2 44%
80-99 99	12	2 54%	3 19%	104	1 61%	2 25%
100-199 99	55	2 34%	2 77%	381	1 83%	2 38%
200-499 99	26	1 97%	2 16%	154	1 87%	2 27%
500 and up	3	2 00%	2 09%	19	1 28%	1 53%
<b>Total/Average</b>	203	2 90%	3 75%	957	1 70%	2 34%
<b>Utilities Only</b>						
2-9 99	0			3	2 00%	3 28%
10-19 99	2	5 13%	8 72%	31	0 86%	1 35%
20-39 99	2	3 88%	5 18%	26	1 40%	2 06%
40-59 99	0			14	0 63%	1 10%
60-79 99	0			8	0 87%	1 13%
80-99 99	1	1 13%	1 34%	8	0 71%	0 98%
100-199 99	2	2 50%	2 74%	28	1 06%	1 42%
200-499 99	1	2 50%	2 65%	16	1 00%	1 40%
500 and up	0			1	3 50%	na <sup>8</sup>
<b>Total/Average</b>	8	3 33%	4 66%	135	1 04%	1 47%

Notes

Total proceeds raised in the United States, excluding proceeds from the exercise of over allotment options

Gross spreads as a percentage of total proceeds (including management fee, underwriting fee, and selling concession)

Other direct expenses as a percentage of total proceeds (including registration fee and printing, legal, and auditing costs)

<sup>7</sup> Lee et al, *op cit*

<sup>8</sup> Not available because of missing data on other direct expenses

**Table 6**  
**Illustration of Patterson Approach to Flotation Cost Recovery**

Time Period	Rate Base	Earnings @ 12 32%	Earnings @ 12 00%	Dividends	Amortization Initial FC
0	95.00				
1	100.70	11.70	11.40	6.00	0.3000
2	106.74	12.40	12.08	6.36	0.3180
3	113.15	13.15	12.81	6.74	0.3371
4	119.94	13.93	13.58	7.15	0.3573
5	127.13	14.77	14.39	7.57	0.3787
6	134.76	15.66	15.26	8.03	0.4015
7	142.84	16.60	16.17	8.51	0.4256
8	151.42	17.59	17.14	9.02	0.4511
9	160.50	18.65	18.17	9.56	0.4782
10	170.13	19.77	19.26	10.14	0.5068
11	180.34	20.95	20.42	10.75	0.5373
12	191.16	22.21	21.64	11.39	0.5695
13	202.63	23.54	22.94	12.07	0.6037
14	214.79	24.96	24.32	12.80	0.6399
15	227.67	26.45	25.77	13.57	0.6783
16	241.33	28.04	27.32	14.38	0.7190
17	255.81	29.72	28.96	15.24	0.7621
18	271.16	31.51	30.70	16.16	0.8078
19	287.43	33.40	32.54	17.13	0.8563
20	304.68	35.40	34.49	18.15	0.9077
21	322.96	37.52	36.56	19.24	0.9621
22	342.34	39.77	38.76	20.40	1.0199
23	362.88	42.16	41.08	21.62	1.0811
24	384.65	44.69	43.55	22.92	1.1459
25	407.73	47.37	46.16	24.29	1.2147
26	432.19	50.21	48.93	25.75	1.2876
27	458.12	53.23	51.86	27.30	1.3648
28	485.61	56.42	54.97	28.93	1.4467
29	514.75	59.81	58.27	30.67	1.5335
30	545.63	63.40	61.77	32.51	1.6255
Present Value@12%		195.00	190.00	100.00	5.00

### Risk Premium Approach

#### Source

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in 30 years with a \$4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated Utility bond yield. The values shown on Schedules D and E are the January values of the respective indices.

#### Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column

$$\text{Stock Return (2002)} = \left[ \frac{\text{Stock Price (2003)} - \text{Stock Price (2002)} + \text{Dividend (2002)}}{\text{Stock Price (2002)}} \right]$$

where  $\text{Dividend (2002)} = \text{Stock Price (2002)} \times \text{Stock Div. Yield (2002)}$

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2002)} = \left[ \frac{\text{Bond Price (2003)} - \text{Bond Price (2002)} + \text{Interest (2002)}}{\text{Bond Price (2002)}} \right]$$

where  $\text{Interest} = \$4.00$